Home Computing WEEKLY

An Argus Specialist Publication

No. 29
Sept 20-26, 1983

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PROGRAMMING ADVICE FOR:
Commodore 64, VIC-20, Dragon, Oric, ZX81, TI-99/4A

'Improved' Spectrum causes software problems

In an attempt to solve two long-standing problems with the Spectrum's graphics, Sinclair has created a new headache for some software houses.

The latest Series 3 Spectrums, produced over the last six to eight weeks, contain a new ULA (uncommitted logic array) chip. The new chip is intended to improve the quality of the Spectrum's colour graphics display, and to ensure that it is now compatible with all makes of TV set.

But according to Mary Reinman, of Sinclair Research, the new chip has had "unforeseen side effects".

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• • •

Parents: 'You're to blame'

Parents are to blame for girls falling behind in computing, according to Acorn's boss.

He was commenting on his company's research, plus a survey — first reported in Home Computing Weekly — showing boys are 13 times more likely than girls to use micros at home.

Chris Curry, Acorn's joint managing director, said: "Many teachers in our survey pointed out how many more boys than girls use micros at home.

Continued on page 5

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(Vol. 2 Issue 5 June, '83)

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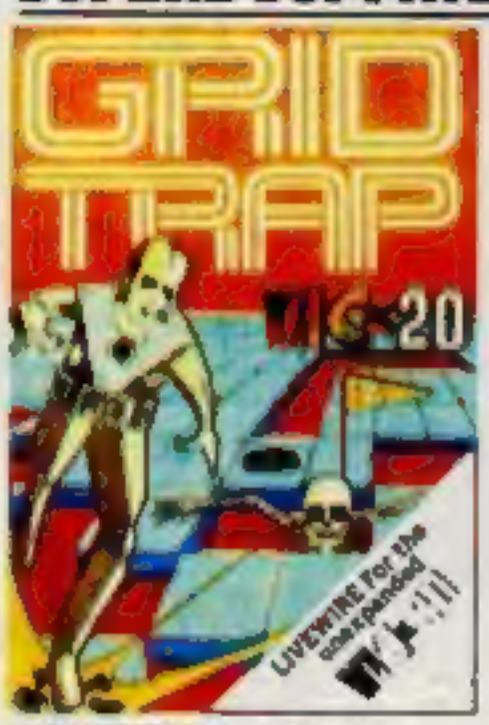

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64

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Continued from front page

"It has affected some software, though none of our own programs or those from our major suppliers," she said.

Specifically, it appears that the new chip has affected the IN function, used to monitor input ports, when the Spectrum is in graphics mode.

It means that some programs, like Buttercraft's Power Graphics, written for the old series of Spectrums, won't work properly on the new ones.

But Sinclair has no plans to modify future Spectrums. Mary Reinman said: "Rather than seeing Spectrums as being affected, they are to our minds improved. It took a long time to develop the new ULA chip, and changing it again is not something we intend to do. It's really a software problem, and changes will have to be made by the software companies.

"The function affected is one that software companies have discovered for themselves — it wasn't in the Spectrum's manual or in the specifications. We didn't say it would be unchanged for ever and ever."

So far, the number of programs affected by the new chip seems to be small. John Rowland, computer buying manager at W H Smith, said: "to date, we have not received any customer complaints, though following this report we will be conducting a full investigation."

And Paul Cooper, software manager at Quicksilva, said: "I'm not keen on the screen display on the Series 3 machines, because it's shifted to the left by about two characters. But so far the only actual problem we've come across is with one of the new machines breaking on us."

• • •

Stand up your computer

Shinecraft's new computer work station has space for your micro, TV, cassette recorder and programs.

And it's on castors so that you can just roll it discreetly out of the way if your family starts to complain that the micro is taking over. Price: £60.
Shinecrest, 5 The Spinney, Hertford, Herts SG13 7JR

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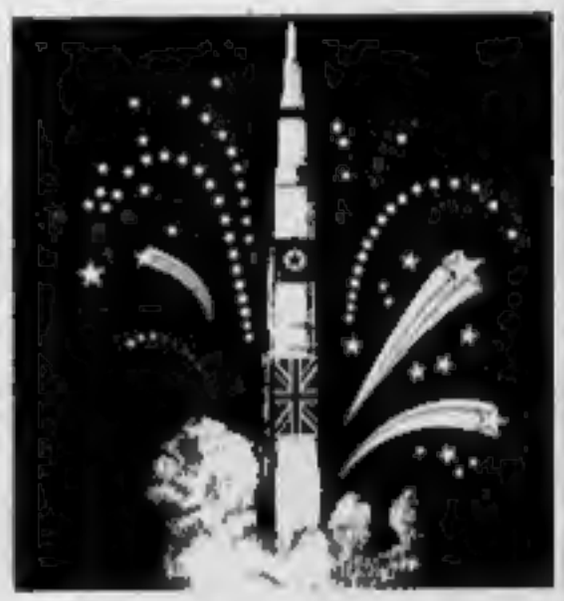

Into space with your Commodore 64 — page 27

Colourful cassette inlays to cut out and keep—pages 15 and 16

What's the connection between this man and the Space Shuttle? Find out on page 40

Professional Software for Spectrum and ZX81

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Tape Loading Problems With Your Computer?

■ **Loading Aid:** Allows you to get tape playback level right first time. Helps with dropouts and to check tape quality too! Standard model £5.95, De luxe model £7.95 ■ **The Microcomputer User's Book of Tape Recording:** Is a practical guide to help you get programs in and out of your computer. Written for the computer user – but several audio and computer professionals have found it useful! ISBN 0 946476 00 4. ONLY £3.15 incl. postage (£2.90 in shops – temporarily out of stock) ■ **Test and Alignment Cassette:** Tape loading problems are often due to a mis-aligned tape head. Align your tape head by ear with our tape – no instruments required! £4.90

ZX81 16K

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FORTH: A full implementation. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available. **Spectrum 14.95**

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MAZEMAN: A fast action m/c game that reproduces the spirit of the original. '..is very accurate and fast.' ....*Which Micro?*... **Spectrum £4.95** **ZX81 £4.45**

CHESS 1.4: Ten levels of play with this m/c program. Good graphic screen display. 'In a class of it's own.' ...*Your Computer*... **ZX81 £5.95**

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Continued from front page

"This has two effects. First, boys get ahead of girls in computer studies. Indeed, the evidence shows that for young teenagers, boys are probably spending more time on computer studies at home than they are at school.

"Second, as the boys race ahead, the girls lose both interest and confidence — a situation aggravated by the relatively small number of machines so far in schools.

"Britain is in danger of losing half its talent if girls don't acquire vital computer skills.

"It is clear that much of the problem is due to parents giving home computers to their sons rather than to their daughters.

"This 'leg-up' for boys means that girls are neither able to compete with their more knowledgeable brothers in school, nor in the even fewer jobs outside."

Some teachers, said Acorn, were so worried that they were starting girls-only computer courses.

A spokesman said the latest research had given added emphasis to an article in the July 26 issue of Home Computing Weekly, headed: "Girls — micros are for you, as well."

Our article in HCW 21 — now concern is growing

Autumn crop of cartridge games

When you've seen the film and read the book, you can play the game.

We've told you about Wargames, the new film about a boy computer genius who accidentally triggers off the countdown to a nuclear war. Now Thorn EMI has announced Computer War, a cartridge game based on the film, in which the player's task is to prevent total destruction of the planet.

It'll be available from Thorn EMI dealers in September for the Atari 400 and 800 at just under £30 and for the VIC-20 at just under £20.

Other games cartridges out this month are Major League Hockey for the Atari 400 and 800, at just under £25, and Medieval Joust for the VIC-20, at around £20.

Lagging behind the rest, but expected by October, three of Thorn's games will also be available for the TI-99/4A: Computer War and Submarine Commander, priced at around £30, and River Rescue, at around £25.

Thorn EMI, Upper Saint Martin's Lane, London WC2H 9ED

A million tests later . . .

Software company Sumlock has moved into add-ons too with a £12.95 joystick with switches claimed to have been tested with a million simulated operations.

The Pro Ace, with a 4½ft cable, is for the VIC-20, Commodore 64 and Atari computers and video games machines and will be on sale next month.

Later models will fit the BBC, Dragon, Spectrum and Oric.

The joystick, guaranteed for two years, has two fire buttons — one on the top and one at the front.

Sumlock, Royal London House, 198 Deansgate, Manchester M3 3NE

Winners by 100 legs

Two young arcade game players are off to Munich to compete in the International Final of the Atari Player of the Year Competition.

In the National Final, held in London on 20 August, contestants had to try their hand at Ataris Centipede cartridge. Stuart Murrey, aged 14, won the under-18 event with a score of 221,983.

The over-eighteen event was won by 19-year-old Andrew Brzezinski, with a score of 197,710.

Over 80,000 people originally entered the competition in local Atari stockists. If the two national winners manage to beat the opposition in Munich, they win an expenses-paid trip for two to the 1984 Olympic Games in Los Angeles.

Briefly

RAMwise is the name A&F Software has coined for its programs which will fill the available RAM — including add-ons — and then auto-run. It means that computers with extra memory can run the more sophisticated programs. A&F began with software for the Atom and is launching six Atom titles, priced at £5.75-£6.90, in time for Christmas. A&F's range now covers computers like the Spectrum and BBC.

A&F Software, 830 Hyde Road, Manchester M18 7JD

□ □ □

Sinclair Research has brought out five new tapes for the Spectrum and one for the ZX81, ranging in price from £4.95 to £12.95. For the Spectrum: Monitor and Disassembler, Zeus Assembler, The Cattell IQ Test, a squares puzzle called Flippit, and a Grand Prix game named Chequered Flag. Mothership is a space adventure for the ZX81 with 16K of RAM.

Sinclair Research, Stanhope Road, Camberley, Surrey

□ □ □

Pinball Wizard, an American import for the unexpanded VIC-20, is claimed to give many of the features of a real pinball table, including nudge. Price: £7.95

Terminal Software, 28 Church Lane, Prestwich, Manchester M25 5AJ

You could be on our pages

We welcome programs articles and tips from our readers.

PROGRAMS should, if possible, be computer printed to a width of 48 characters (use a new ribbon) and/or sent on cassette. Check carefully that they are bug-free. Include details of what your program does, how it works, variables you have used and hints on conversion.

ARTICLES on using home computers should be no longer than 2,000 words. Don't worry about your writing ability — just try to keep to the style in HCW. Articles most likely to be published will help our readers make better use of their micros by giving useful ideas, possibly with programming examples. We will convert any sketched illustrations into finished artwork.

TIPS are short articles, and brief programming routines which we can put together with others. Your hints can aid other computer users.

Competitive rates are paid.

Keep a copy of your submissions and include an SAE if you want them returned. Label everything clearly and give a daytime and home phone number if you can.

Paul Liptrot, Home Computing Weekly, 145 Charing Cross Road, London WC2H 0EE

The CPD 8300 computer cassette recorder from Smiths — a new look and more features

New-look recorder

W H Smith has launched a new own-brand computer-compatible cassette recorder, which should be in their branches within the next couple of weeks.

The new recorder is called the CPD 8300, and is said to operate reliably with any personal computer that loads and saves programs using standard microphone and earphone sockets.

The CPD 8300 has all the features of Smiths' original computer cassette recorder, but has been redesigned to give better visibility. It has a three digit tape counter and a cue/review facility.

It also features an electronic pause which can be overridden by computer control, using the remote motor control socket. This also means that you can use the recorder while the Remote connection is still plugged in.

Both Save and Load levels are adjustable, and there are two Save input sockets to cater for computers with Save signals of different levels. The signal level indication meter lights up for easier viewing.

The recording/playback head has also been designed to be easily adjustable.

Price: £39.95.

W H Smith, 10 New Fetter Lane, London EC4A 1AD

Dragon takes flight

Dragon owners can fly through the air with the greatest of ease with the Dragonfly Flight Simulator from Hewson.

But Dragonfly should not be confused with Hewson's Night Flight program for the Spectrum. According to Gordon Hewson. "Dragonfly is written by a completely different person, who flies as a hobby — it's not a conversion from Night Flight.

"Because of the Dragon's limited graphics, some of the instruments you find in the Spectrum program are missing, and information like the bearing has to be given in figures.

"But there are two runways on Dragonfly, and you can do things like loop the loop and barrel rolls."

You take off from Norwich Airport and fly a circuit landing at their either Hethel or back at Norwick, depending on how much of a challenge you want. At Hethel, there are no runway lights, and you have to make your landing with the aid of a radio beacon.

Dragonfly can be played with a joystick and costs £6.95.

Hewson, 60a St Mary's Street, Wallingford, Oxon OX10 0EL

Ian makes a Splat . . .

Software writer Ian Andrew, 24, is bringing out his first game under his own label.

Mr Andrew, who wrote Mined-Out for Quicksilva, is now the managing director of Reading-based Incentive Software — and his mother, Barbara, is the company secretary.

For the last four-and-a-half years he has been selling collectors' postcards by mail order and it is the profits from this that are being used to launch Incentive.

The new company's first cassette is Splat, a £5.50 game for the 48K Spectrum due out in about a fortnight. Mr Andrew said he and 18-year-old Ian Morgan wrote it over six months. It featured a £500 prize for the best score by January.

Mr Andrew said: "I've got several ideas in the pipeline. I'll have to see how Splat goes. I thought it would be a bit of a challenge to compete with the big boys." He would continuing writing for Quicksilva.

Incentive Software, 54 London Street, Reading, Berks RG1 4SQ

If music be the food of micros . . .

The British home micro industry has reached an impasse: it cannot go much further in its present direction without stagnating. Furthermore, for the first time it now faces serious competition from Japan with the arrival of the Sord M5.

So is this new jewel in the crown of British industry finally to go the way of so much of manufacturing industry recently? Is it to suffer the same indignities as cars, motorcycles and cameras at the hands of the ruthlessly efficient Japanese export machine?

For several reasons the answer is probably no — at least, not for a long time. For one thing, the home micro industry enjoys a degree of government collaboration that the rest of manufacturing industry does not.

British micro makers also have an advantage in components: the Americans and Japanese may lead in big RAMs and processors, but the UK is widely renowned for low volume custom-made chips.

There is also, I believe, a more subtle reason why our micro industry will survive — one related to innovation.

Consider the car industry. The innovations on new cars tend to be limited and cautious, the approach is evolutionary rather than radical. Competition between companies is on the basis of cost which usually depends on production management.

Contrast this with a computer program which requires virtually no production management but consists, as nearly as anything can, of pure ideas.

Most manufactured objects fall somewhere between these two extremes, but if we imagine a scale with cars at one end and programs at the other then micro computers will tend to fall nearer to programs than they do to cars.

The fact that the Japanese are very successful at making cars and the British very successful at producing good software therefore promises well for the micro industry.

There is however a critical difference between having a talent for innovation and applying it in the right place, and recently the market has grown a little stale.

New models tend to look very much like old models, and you could be forgiven for thinking that the only reason the micro was invented was to play games that have changed remarkably little since Space Invaders.

One innovation likely to catch on is the Microdrive and its partner the Interface 1. With the competition nowhere in sight, it is likely that interfaces to connect the Microdrive to other micros will be made. Nevertheless the Microdrive is a device more likely to consolidate old markets than create new ones.

Ironically, it is the M5 itself with its "mini synthesizer" that clearly indicates one way forward.

I am constantly astonished that a country like ours, with such an enormously successful music industry and where Yamaha sell thousands of organs every year, should produce home computers on which the music facilities are invariably poor, derisory or non-existent.

Manufacturers naturally want to keep the cost of the basic unit down, but there is also a general lack of musical add-ons. Music could well provide a growth area that is as large as the whole industry is at present. With the increased popularity of standard interfaces a potentially fast growth area.

British micro manufacturers have made a huge impact both at home and abroad. With a little imagination and making full use of their advantages they are ideally placed to sound off the Invaders.

S.J. McQuillen
Freelance Writer
Kinmel Bay,
Rhyl

• This space is for you to sound off about the micro scene, to present bouquets or to hurl brickbats. Share your views by sending them to Paul Liptrot, Opinion, Home Computing Weekly, 145 Charing Cross Road, London WC2H 0EE. Please include your occupation and your interest in computing.

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Here's a selection of bright ideas sent in by our readers. If you've made a discovery about your micro, why not share it with other enthusiasts by sending it in to us at: Micro Tips, Home Computing Weekly, 145 Charing Cross Road, London WC2H 0EE.

Double your height VIC-20

Not many VIC-20 owners realise that double height characters can be produced on their machine. But it is possible — just enter the following program:

```
10 POKE 56,24: POKE 55,0
20 A=6144
30 POKE 36879,27
40 FOR X=A TO 7678 STEP 2
50 B=PEEK (32768+(X-A)/2)
60 POKE X,B
70 POKE X+1,B
80 NEXT X
90 POKE 36867,PEEK (36867)
100 POKE 36869,254
110 POKE 36881,20
120 PRINT "(CLR)":NEW
```

Line 120 is to clear the screen. If the program is run/stop and restored, it must be entered again. Make sure the program is saved before running.

Philip Bidwell

Data speed VIC-20 / Commodore 64

This program may be used on a VIC-20 or Commodore 64, speeding up a file saving on both machines. As data is saved at 300 baud, any improvement is a blessing, saving both time and tape space.

The program uses routines in the ROM to save at the same baud rate, but achieves greater speed (usually 10 times faster) by saving individual bytes instead of whole variables, totally in machine code. Thus, saving speed is increased but reliability is exactly the same.

For example, to save a screen to tape, the quickest method in Basic is to use integer variables, which as a file take up five bytes each. The whole screen takes seven minutes to save. Using Dataspeed, variables are stored as 1 byte and the screen takes 40 seconds to save.

To use the program, A$ must first be set to the function you want the routine to perform: saving or loading. A% is then set to the start of memory to be saved, and B% to the finish of the memory section. The program may then be run.

Note that on loading, the variables will be stored at the same locations that they were saved from.

Machine code is stored at the top of Basic RAM. To protect it from being erased by variables, the pointer to the top of Basic RAM is lowered using lines 10 and 20.

Lines 30 to 60 poke the routine into this RAM. The mid part of the program operates this routine and converts the integer variables into a form usuable by machine code. Locations 251 to 254 are vectors for the machine code. Finally, lines 1000 onwards contain data of the machine code to be poked.

David Rees

```
1 REM* DATASPEED *
2 REM*     BY    *
3 REM*DAVID  REES*
10 POKE51,0:POKE52,159
20 POKE55,0:POKE56,159
30 FORH=0TO41
40 READA
50 POKE40704+H,A
60 NEXT H
80 REM * A$=SAVE OR LOAD *
90 A$="SAVE"
100 REM * A%=START B%=FINISH *
110 A%=4096:B%=4352
120 AX=A%AND255
130 AY=(A%/256)AND255
140 BX=B%AND255
150 BY=(B%/256)AND255
160 IF A$="SAVE" THEN 200
170 IF A$="LOAD" THEN 400
180 END
199 REM* SAVE *
200 POKE251,AX:POKE252,AY
210 POKE253,BX:POKE254,BY
220 SYS40704
230 END
399 REM* LOAD *
400 SYS40726
410 END
1000 DATA162,1,160,255
1010 DATA32,186,255
1020 DATA169,0,32,189,255
1030 DATA169,251,166,253
1040 DATA164,254,32,216,255
1050 DATA96
1060 DATA162,1,160,255
1070 DATA32,186,255
1080 DATA169,0,32,189,255
1090 DATA162,255,160,255
1100 DATA32,213,255,96
```

Take a BREAK ZX81

Every ZX81 owner knows that the BREAK key is situated in the bottom right-hand corner of the keyboard. However, we've found that if you press SHIFT, Z, V and B simultaneously, this will also interrupt a program and produce the D report code.

I also have some useful USR routines. If you type RAND USR 836, the display will freeze until only the BREAK key is engaged.

And here's an alternative to typing NEW to clear your program. If you type RAND USR 0 (followed by NEWLINE), this will act in the same way as the NEW command.

ZX81 owners are probably aware of the POKE numbers in Chapter 28 of the ZX81 manual. However, poking address 16384 can affect the screen display very dramatically. Try POKE 16384,40 or POKE 16384, 171.

Andrew Barr & Andrew Medcalf

Cap it all Oric-1

I recently discovered yet another way of turning on or off the caps lock on the Oric.

As you will already know, CHR$(20) switches caps lock, but caps lock has a toggle effect.

To get around this you can PEEK into the screen location where the caps reminder normally is.

So to switch off caps use:

```
IF PEEK (#BBA4)=67 THEN
   PRINT CHR$(20)
```

And use the same line to switch them back on again.

J.B. Laverick

Rolling titles TI-99/4A

Here is a tip for that nice "rolling titles" effect, for the much-neglected TI-99/4A.

```
1 REM  ROLLING  TITLES
   PROGRAM
2 CALL CLEAR
3 FOR M = 1 TO 12
4 CALL COLOR (M, 6, 1)
5 NEXT M
6 CALL SCREEN (16)
7 REM  P. M-G,  1983  FOR
   HCW
10 FOR I = 1 TO 10
20 READ A$ (I)
30 PRINT :::::
40 PRINT  TAB  (13)  —
   LEN(A$(I))/2; A$(I)
50 NEXT I
60 DATA ANYTHING YOU
   LIKE, COULD BE PUT, IN
   HERE, JUST ALTER THE
   LOOP,  INCREMENT  TO
   SUIT
70 DATA YOURSELF, YOU
   COULD  EXIT  PRO-
   GRAM,  BY
   SUBSTITUTING  THE
   RESTORE,  STATEMENT
   WITH CALL KEY ETC,
   GOOD COMPUTING
80 RESTORE
90 GOTO 10
```

Peter Maskell—Glynn

Amazing draws Spectrum

Try the following:

```
10 PLOT 100,100 : DRAW 10,
   10,44
```

This powerful effect is probably the result of a bug in the Spectrum's ROM, but by careful manipulation we can produce some clever patterns using a small amount of memory. I offer no more examples, since this routine is best learned through practice.

Tim Boone

Direct colours Spectrum

Go into Extended mode (cursor E) after a line number and press 2. The cursor will have turned red. What we have done is altered the paper colour directly. CAPS SHIFT followed by a number 0-7 gives us directly the ink colour as printed above the appropriate key.

Using this method we can also directly employ the BRIGHT, FLASH, and INVERSE commands — see the table on page 115 of the Spectrum manual for the combinations.

The users of this are many and varied. You can highlight REM statements, manipulate colours within strings of graphics and even produce blank listings.

After the copyright message on your amazing program, go into extended mode, press CAPS SHIFT 0, and then 0 again in Extended mode. The listing will appear all black: safe from prying eyes!

Incidentally, each direct colour command takes up only two bytes instead of the eight you would use typing INK X. Enough of my chat — go away and practice.

Tim Boone

Watch that space

Our review panel boldly goes to check out another batch of space games

Startrek
BBC £5.95

Logic Systems, 129 High Street, Cherry Hinton, Cambridge

Another company boldly going where others have boldly been before! For the newcomers, this game involves wandering around a grid type galaxy, exterminating Klingons and refueling at starbases. You have control over movement, phasors, torpedoes and shields.

All the standard information is given, long/short range scan, Enterprise status etc. An added feature is to choose Klingon ship mobility — 0 is static, 6 is fast, and you have a time limit in which to complete your mission.

There are many factors in choosing a display format on the BBC — good graphics but with little text, Model A with limited memory etc.

Logic Systems have compromised with a Mode 7 text display — probably in order to get it into a model A — but have, at the expense of the graphics, got all the necessary information on screen at once.

The game loaded easily and, with the aid of the cassette insert, I ventured forth; a pencil and paper is also useful.

It took a few plays, but the commands soon became familiar. Response was fast, even though the program is written in BASIC, and the game demands quick thought rather than quick reactions.

Colour and sound are used effectively and the screen layout is easily read. **R.E.**

instructions	70%
playability	75%
graphics	60%
value for money	90%

★ ★ ★ ★ ★

Venus Voyager 2
Atari 400/800 32K £14.95

English Software, 50 Newton St, Piccadilly, Manchester M1 2EA

Argh! I've always believed in making games challenging at the lower levels, but this is ridiculous.

The scenario is simple. You have to manoeuvre your spaceship down into caverns, avoiding collissions, to rescue six people by landing on the pads.

There are various static objects such as radar and space mines to be avoided.

Simple? This pilot admits to rescuing one person from the six caverns with his regulation six ships.

The ship responds well, and retro control is easy enough, but I just could not succeed.

The ships can be refuelled in-flight, but this too was beoynd me.

This one is for people with better reactions than mine, and a lot more patience. **M.F.**

instructions	60%
playability	85%
graphics	70%
value for money	70%

★ ★ ★ ★

Operation Moon
TI-99/4A (Extended BASIC) £10

Lantern Software, 4 Haffenden Road, Tenterden TN30 6QD

I have mixed feelings about this program, whose graphic excellence is marred by apparent deficiencies (still!) in the Sprite facility of Version 110 Extended BASIC.

The aim is to ferry supplies from three planet-based platforms to a mother ship, avoiding collisions with an orbiting comet and confrontations with 'blood-red banshee space bats'. You can get the bats with 'glee bombs' or the comet, but you need to exercise care!

The detailed, if difficult-to-read, instructions warn that docking must be spot-on.

But on several occasions I noted either a lack of vertical movement while close, but not close enough, to the mother ship (you need to back off and try again), or an apparently perfect docking, pixel for pixel, which results in an airlock opening in space on attempting unloading, and hence disaster. Bugs such as these are extremely disheartening, and confusing to the novice.

The degrees of difficulty offered are 1:hardest to 10:easiest, and control is through the keyboard rather than joysticks. Although the game will interest younger players, it does not warrant its high price. **P.B.**

instructions	80%
playability	75%
graphics	85%
value for money	40%

★ ★

Confusion
48K Spectrum £5.95

Blaby Computer Games, Crossways House, Lutterworth Rd, Blaby, Leicester

Your ship can be positioned at any one of six levels in space. Alien craft then approach you from the left and right, and you must destroy them by flipping your craft through 180 degrees and shooting them down.

If you miss the alien craft and they collide with you from the front or the rear, you lose the ship. When you have written off five ships, the game ends.

The graphics are good and so are the sound effects, but the balance of this game seems to be wrong.

There appears to be no difference in skill levels between the six levels in space and therefore, there was little point in moving.

All the alien craft accrue the same points when hit and they all move at the same speed (only the colours and shapes are different).

Also, one's craft has an unlimited supply of ammunition, so there is no penalty for continuous use of the fire button. In addition, there was little difference between the 'slow' and 'fast' speed options.

This game seems to have quite a good potential if the plot and balance of play could be suitably redressed. **M.B.**

instructions	60%
playability	85%
graphics	60%
value for money	60%

★ ★ ★

Droids
Dragon 32K £6.95

J. Morrison, 2 Glendale Street, Leeds LS9 9JJ

An exceedingly difficult, arcade style, shoot-out game. Horrible little droids insist on removing a series of shields which support three large and deadly trioxin bombs.

If they succeed, then you are immediately relieved of one of your three lives.

Other ways to disaster are to be hit by the discarded lead shields as they drop, or machine gunned by one of the remaining few droids, which start moving at an incredible rate when most of their colleagues have succumbed.

The droids have a further advantage in that they appear to scroll sideways round the screen, whereas you are forced to move left and right to intercept them.

It is well worth the effort to clear the first screen, though, as a pleasant tune is played and you are rewarded with an extra life. Second and subsequent screens are in a different colour set.

There are two versions on each cassette — joystick, or an even faster version using arrow keys and space-bar.

Loading was always successful with no need to use the back-up copy on the 'B' side. The choice of colours means that a black and white TV set can be used if necessary. **E.C.**

instructions	90%
playability	85%
graphics	90%
value for money	90%

★ ★ ★ ★ ★

Be a hero — here's the catch . . .

Help gallant Fred save the helicopter crew from a watery grave, in Geoff Allen's game for any Spectrum

What would you do if you were walking along, minding your own business, when you saw a helicopter in trouble and its crew bailing out?

This is what happened to Fred as he was crossing the bridge on the way home for his tea. Being no fool, he realised that if he didn't catch the falling men they would drop into the river and drown.

So he waited for the first men to come sailing down and — well — you can find out for yourself what happened by typing in my program for any Spectrum.

Once you have typed it in, it will draw a bridge at the bottom of the screen with Fred standing on it. As the helicopter gets lower and lower, it gets harder and harder to catch the men, but here are only 12 of them.

It can be done, but when Fred has successfully caught the first lot, along comes another helicopter, losing eight rapidly ...

Use O to move Fred left and P to move him right. If you move him off the right side of the bridge, he will appear on the left.

How it works

0-180 defines graphics
300-410 main loop
1000-1220 second loop (with parachuter)
2000-2070 adds one on to score
3000-3020 takes away one life
4000-4078 finish
5000-5500 instructions
6000-6040 "you did it!"
Note: to save, type in SAVE "PARATROOP" LINE 1

Hints on conversion

There are seven different graphics used in my [illegible]. Three for the bridge, two for the helicopter and two [illegible] parachutist. The man on the ground is the same graphic as the bottom half of the parachutist.

The Spectrum uses a [illegible] graphics and FOR/NEXT loops to create them.

PAPER controls the background colour,
INK controls the foreground colour and
BORDER controls the border colour
BRIGHT means exactly that and can be omitted if your computer doesn't have this feature
CLEAR means 'clear the screen'
FLASH means flash on and off like BRIGHT it can be omitted.

The Spectrum's screen arrangement is 20 lines down by 32 lines across. Line 0 is the first number in both cases.

So line 10 which says
10 PRINT AT 10,5; FLASH 1; "Stop the tape"
means print at line 10, [illegible] the Spectrum is roughly in the middle, flashing "stop the tape".

The Spectrum's sound is controlled by the BEEP statement. The only one used is in line 2020. This line can easily be changed for your computer.

Variables

score your score
hi high score
lives lives left
a y coordinate of helicopter
b x coordinate of helicopter
g x coordinate of Fred
Q1 number of paratroopers

```
  6 PAPER 7: BORDER 7: INK 0: C
LS
  10 PRINT AT 10,5; FLASH 1;"Sto
p the tape"
  20 PRINT ''''''"Do you want in
structions ";
  25 PAUSE 0
  30 IF INKEY$="y" THEN GO TO 50
00
  32 IF INKEY$<>"y" THEN GO TO 5
0
  40 GO TO 30
  50 FOR n=0 TO 7: READ a: POKE
USR "b"+n,a: NEXT n
  60 DATA 248,120,240,248,248,24
2,65,252
  70 FOR n=0 TO 7: READ a: POKE
USR "a"+n,a: NEXT n
  80 DATA 31,64,231,255,79,7,0,7
  90 FOR n=0 TO 7: READ a: POKE
USR "c"+n,a: NEXT n
 100 DATA 189,189,153,126,24,24,
35,229
 110 FOR n=0 TO 7: READ a: POKE
USR "d"+n,a: NEXT n
 120 DATA 24,60,126,255,255,231,
195,129
 130 FOR n=0 TO 7: READ a: POKE
USR "e"+n,a: NEXT n
 140 DATA 255,66,36,24,24,36,66,
255
 150 FOR n=0 TO 7: READ a: POKE
USR "f"+n,a: NEXT n
 160 DATA 129,66,20,12,2,2,1,1
 170 FOR n=0 TO 7: READ a: POKE
USR "g"+n,a: NEXT n
 180 DATA 129,70,40,48,84,64,125
,128
 200 LET hi=0
 270 LET score=0: LET lives=5
 280 INK 0: LET a=1: LET b=0: LE
T g=13
 282 LET Q1=0
 284 PAPER 5: BORDER 5: CLS
 286 PRINT AT 20,0; INK 1; PAPER
T 1;"[illegible]"
 300 PRINT AT a,b;" [illegible]"
 305 PRINT AT 0,0;"Score ";score
;"    lives ";lives;"  Hi score"
;hi
 310 PRINT AT 19,g; INK 2;" [illegible] "
 320 LET r=INT (RND*100)
 330 IF r>=60 THEN GO TO 1000
 340 LET b=b+1
 350 IF b=29 THEN : PRINT AT a,2
9;"  ": LET a=a+1: LET b=1
 360 IF Q1=Q1+9 THEN GO TO 6000
 370 IF g=1 THEN : LET g=28: PRI
NT AT 19,0;"  "
 380 IF INKEY$="o" THEN LET g=g-
1
 385 IF g=28 THEN : LET g=1: PRI
NT AT 19,28;"  "
 390 IF INKEY$="p" THEN LET g=g+
1
 410 GO TO 300
1000 LET c=a+1: LET d=b: LET e=a
=2
1005 IF d=0 OR d=1 OR d>=28 THEN
 GO TO 300
1100 PRINT AT a,b;" [illegible]"
1110 PRINT AT 0,0;"Score ";score
;"    lives ";lives;"  Hi score"
;hi
1120 PRINT AT 19,g; INK 2;" [illegible] "
1125 PRINT AT c-1,d;" "
1130 PRINT AT c,d; INK 7;"[illegible]"
1140 PRINT AT e,d;"[illegible]"
1150 LET b=b+1
1155 IF e=19 THEN GO TO 7000
1157 LET c=c+1: LET e=e+1
1160 IF b=29 THEN : PRINT AT a,2
9;"  ": LET a=a+1: LET b=0
1170 IF Q1=Q1+9 THEN GO TO 6000
1180 IF g=1 THEN : LET g=28: PRI
NT AT 19,0;"  "
1190 IF INKEY$="o" THEN LET g=g-
1
1195 IF g=28 THEN : LET g=1: PRI
NT AT 19,28;"  "
1200 IF INKEY$="p" THEN LET g=g+
1
1220 GO TO 1100
2000 LET Q1=Q1+1
2001 PRINT AT c,d;" "
2009 FOR n=0 TO 7
2010 BORDER n
2020 BEEP .1,n
2030 NEXT n
2040 LET score=score+1
2050 PRINT AT c,d;" "
```

SPECTRUM PROGRAM

```
2050 PRINT AT e,d;" "
2065 BORDER 5
2067 IF 01=12 THEN GO TO 6000
2070 GO TO 300
3000 BEEP 1,-20
3010 LET lives=lives-1
3013 IF lives=0 THEN GO TO 4000
3015 PRINT AT c,d;" ": PRINT AT
e,d;" "
3017 IF 01=12 THEN GO TO 6000
3020 GO TO 300
4000 PAPER 2: INK 7: BORDER 2: C
LS
4020 IF score>hi THEN PRINT AT 0
,0; INK 7;" You got the new high
 score !!"
4021 IF score>hi THEN LET hi=sco
re
4030 PRINT AT 4,4;" You got ";sc
ore
4050 PRINT AT 10,0;" Do you want
 to play again ?"
4070 IF INKEY$="y" THEN GO TO 27
0
4075 IF INKEY$="n" THEN NEW
4076 GO TO 4070
5000 PAPER 7: BORDER 7: INK 0: C
LS
5010 PRINT "By Geoff Allen"
5020 PRINT "                    "
5030 PRINT "  You are Fred.You
are just        walking along the
 old railway "
5040 PRINT " bridge when you see
 a Chopper     in trouble.Its cre
w are bailing out and you must c
atch them "
5050 PRINT " or they will fall o
f the bridge and drown.When you
have got all 12 down you start a
gain"
5060 PRINT "   "                 O   P
                    <<<  >>>"
5500 PAUSE 0: GO TO 50
6000 FOR n=0 TO 10
6010 BEEP .05,10
6020 NEXT n
6030 PRINT AT 10,0; FLASH 1;"You
 did it"
6032 PAUSE 0
6033 PAUSE 0
6035 PAUSE 0
6040 GO TO 280
7000 IF d=g+.5 OR d=g+1 OR d=g+1
.5 THEN GO TO 2000
7010 GO TO 3000
```

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Demon Decorator
BBC B £7.95

Program Power, 8/8a Regent Street, Chapel Allerton, Leeds LS7 4PE

This is the kind of decorating I could enjoy. The game features the unlikely combination of a paint roller chased by an octopus around a grid. The aim is to guide the roller to paint in the grid squares and points are awarded for each square completed

If the octopus gets too close for comfort pressing the 'stun' key immobilises him for a few seconds. Only five stuns are available, unless you can collect extra stun diamonds on your travels around the grid. The completion of a full grid earns you an extra roller

The instructions on the cassette insert are adequate, and the program also indicates which keys to use.

The graphics are quite good and the action is smooth, apart from the actual filling in of a square which is a little jerky

As each grid is completed the octopus gets a little faster on the next level — so save those stuns as long as you can

One useful feature, games programmers please note, is a pause and restart facility, which is just the thing for those occasions when the phone rings as you are about to beat your high score

No obvious bugs were detected, although occasionally the roller did seem to have a mind of its own D.H.

instructions	80%
playability	80%
graphics	75%
value for money	75%

★ ★ ★ ★

Quackers
Spectrum £5.99

Rabbit, 380 Station Road, Harrow HA1 2DE

Roll up, roll up! Take off your jacket, take aim and take your best shot at 'Quackers' a delightful and diverting game for the young at heart

The game is set, as you may have guessed, in a shooting gallery and you are invited to take pot shots at moving cats, bunnies, ducks, faces and even a full size, if rather docile, turtle!

Good use is made of colour graphics and sound — the game feels like a shooting gallery with the numerous targets moving in different directions.

The faces are quite hard to hit due to the presence of a moving wall in front of them with only a small gap in it. If you manage to hit all the targets within the time limit you get to take on the turtle

In my view the game is a little too easy and lacks lasting playability for this. The turtle was an easy 200 points! Nevertheless this novel game will probably become a firm favourite among Spectrum owning children and tired parents longing for a change from 'shoot 'em up' games. T.B.

instructions	60%
playability	55%
graphics	70%
value for money	60%

★ ★ ★

Danger Mower
BBC B £5.95

Logic Systems, 129 High Street, Cherry Hinton, Cambridge

Danger Mower is original but also rather boring, unfortunately. The aim of the game is to steer your mower around a lawn and avoid the hazards you meet along the way — cowpats, rocks, and walls

You have also to collect fuel for the mower, which is spread in cans over the lawn too. You collect points for the areas of the lawn you haven't already cut and leave a yellow trail behind your mower so that you know where you've been.

The colours are rather difficult to see unless you have a good monitor, as the yellow cut path on the green lawn shows very little contrast. The graphics are only fair too, using just four colours. This is a real pity, as they could have raised my enjoyment of the game considerably

There is also a constantly-playing tune which, although pleasant in the short term, is wearing over long periods. You can, however, turn this down if you wish

I found the dexterity involved enjoyable, but the lawn was far too big to complete before losing concentration I have begun to expect more than software houses than this program gives and I feel that it is vastly overpriced D.C.

instructions	60%
playability	50%
graphics	60%
value for money	30%

★ ★

Centipede
Oric-1 £6.95

PSS, 452 Stoney Stanton Road, Coventry, CV6 5DG

Featuring the usual multi-legged creature wandering round the garden at high speed in between the mushrooms, and backed up by mushroom laying bugs, fleas and a spider that appears when you have shot down all segments of the centipede for the first time

Starting with three lives, the object is to eliminate the centipede that is travelling down the screen before it, or any of the other insects get you As you fire at the centipede, it breaks up and attacks from different angles

If you kill the centipede, the game restarts with fresh sheet and, on the third sheet, a mushroom laying bug will drop from the top of the screen. On the fifth, there are two centipedes to contend with, but it is difficult to reach this stage.

Although the sound levels are not high, graphics are good, but unfortunately the centipede, mushrooms and spider, along with your gun, are all in white, and lack colour variety The only brief flash of colour is when you have shot down the centipede.

Centipede is an addictive game and PSS provides a quick-moving, all-action version But I've seen better — and cheaper versions

instructions	85%
playability	70%
graphics	75%
value for money	55%

★ ★ ★

Worm
48K Oric £4.95

Pasesoft, 213-215 Market Street, Hyde, Cheshire, SK1 1HF

If the title sounds familiar then it's because this is another rendering of an old favourite, which usually goes by the name of snake

The scenario follows the usual pattern: you are a worm (somehow it doesn't sound as glamorous as a snkae) and your aim in life is to move around the garden eating any stray numbers which you may come across.

With each meal your body increases in length according to the size of the number you eat. Unfortunately for you you cannot stop moving, and so as the game progresses it becomes increasingly difficult to avoid eating your own body (and consequently killing yourself).

As if that isn't enough to contend with there are various other nasties (fortunately stationary) such as spiders and flowers randomly strewn about the garden. Contact with any of these or the garden wall kills you for no readily apparent reason.

This is a competent attempt at a fairly straightforward game. It is fast enough to give it that addictive quality and the inclusion of nine different levels of play should keep you occupied for quite a while. Another nice touch is a hall of fame to save you noting down your best score of the day G.P.

instructions	60%
playability	75%
graphics	55%
value for money	70%

★ ★ ★ ★

Set your sights on ducks instead

Your chance to test your skill at the computer version of a fairground shooting gallery. Alan Gray's Duck Shoot game runs on the Dragon, with joystick

Hints on conversion

It would be rather difficult to convert Duck Shoot to run on another computer as the Dragon has rather special hi-res graphics commands, such as GET and PUT. The best way is to use the idea and write your own program. Sorry, folks!

If you are fed up with blasting alien invaders try blasting ducks instead.

My program for the Dragon, with joystick, is loosely based on the fairground shooting gallery.

The joystick acts as your rifle and the button is the trigger.

At the start of each game you get 10 shots and the duck will pass 15 times at a random speed to make it even more tricky to anticipate its position.

Duck Shoot is written in BASIC mode 3 with a machine code routine to simulate the gunshot sound.

If your Dragon does not support the high-speed POKE, delete line 10 and that POKE (&HFFD7,0) in line 390.

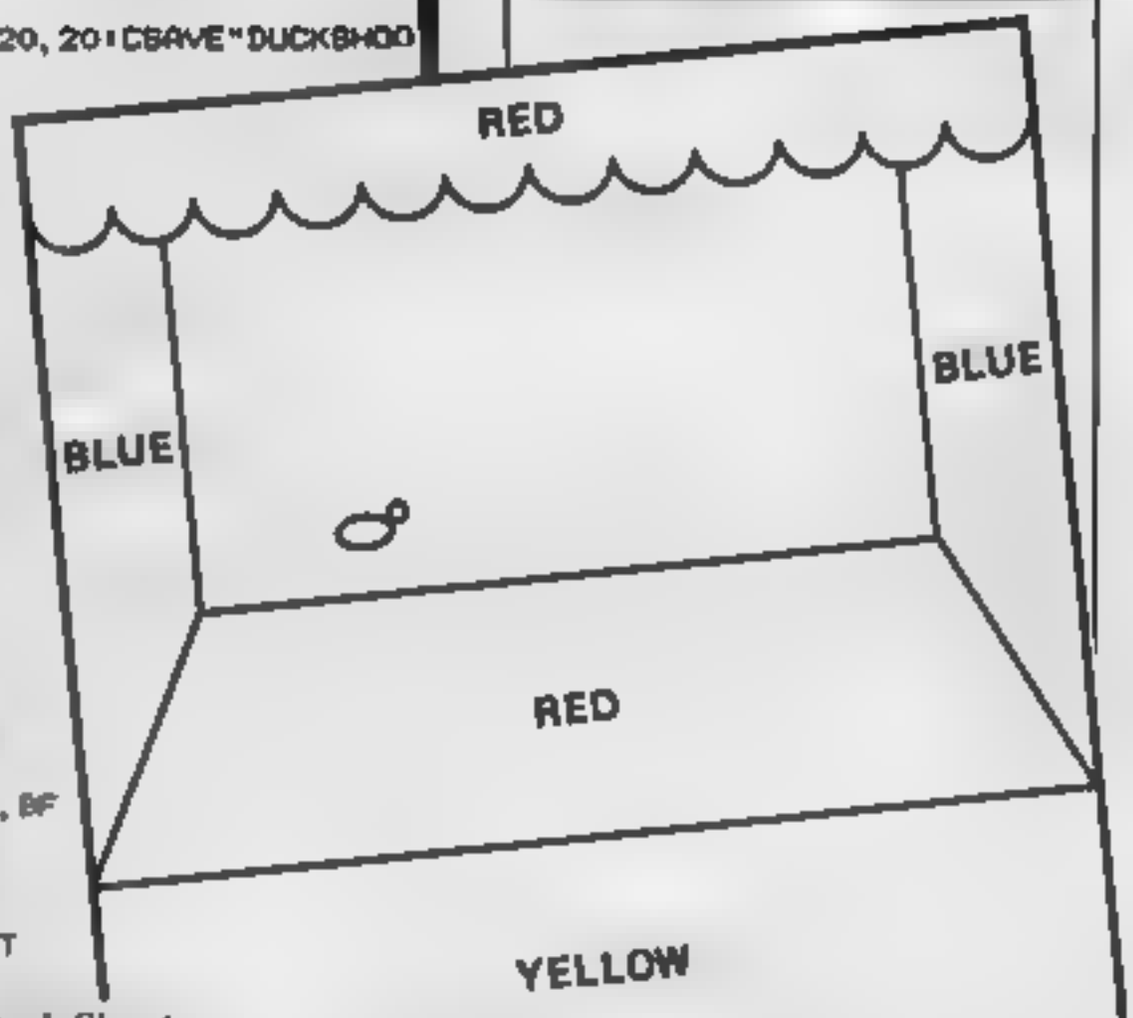
Main variables

GETA yellow duck
GETB green duck
U and **I** DRAW loop for half circles on canvas top of booth
HT hit counter
SH shot counter
JO joystick inputs
R main loop
RD rifle starting point
X1,X2,Y1,Y2 co-ordinates for rifle
FR detect fire button
C detect hit
X random speed for duck

How it works

50-80 DRAW and GET yellow duck
90-130 DRAW and GET green duck
140-330 DRAW and PAINT show booth
360-470 main play loop
390 PUTs yellow duck on screen and move it along four points at a time
500-530 hit loop
400 READ joystick, DRAW gun
450 fill in gun drawing
460 fill in duck at end of run
520 PUT green duck on screen if yellow one is hit
540-580 machine code shot sound
590-670 scoreboard
680-750 instructions

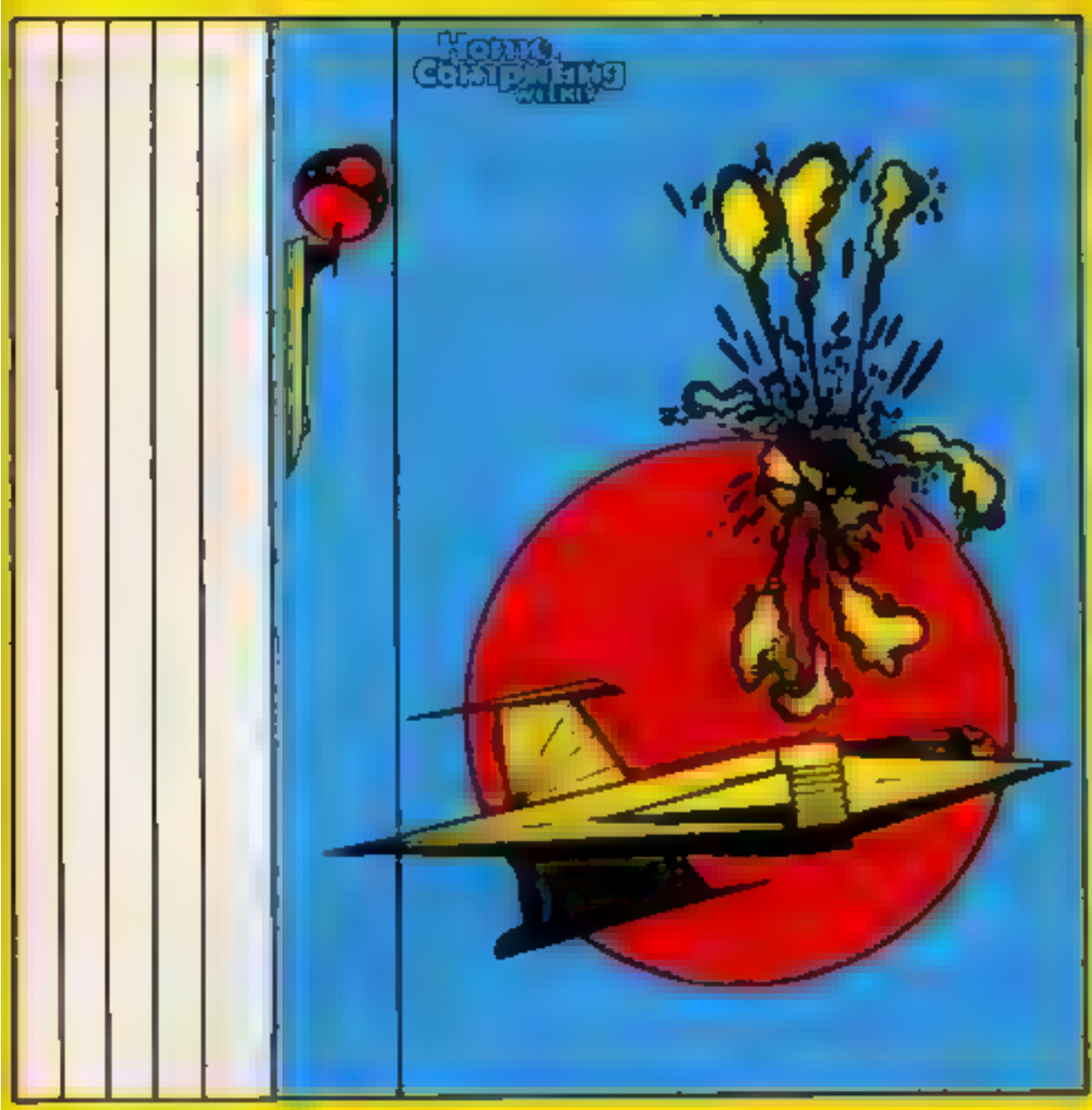
```
1 REM A.GRAY .. 1983
10 POKE&HFFD7,0
[illegible]
20 GOTO540
30 POKE&HFFD6,0:MOTORON:SOUND120,20:CSAVE"DUCKSHOO
T":STOP
40 PMODE3,1:PCLS:COLOR2
50 DRAW"BM18,19;R1E1H1L1G1F1"
60 DRAW"BM10,24;R5E2H2L5G2F2"
65 PAINT(14,22),2,2
70 DIMA(11)
80 GET(0,10)-(20,30),A,G:PCLS
90 COLOR1
100 DIMB(11)
110 DRAW"BM18,19;R1E1H1L1G1F1"
120 DRAW"BM10,24;R5E2H2L5G2F2"
130 GET(0,10)-(20,30),B,G
140 COLOR3,1
150 LINE(0,90)-(255,90),PSET
160 COLOR2,1
170 LINE(36,91)-(219,91),PSET
180 COLOR4,1
190 LINE(0,0)-(0,192),PSET
200 LINE(0,0)-(255,0),PSET
210 LINE(255,0)-(255,255),PSET
220 COLOR2,1
230 LINE(0,152)-(255,255),PSET,BF
240 LINE(36,10)-(36,92),PSET
250 LINE(36,92)-(0,152),PSET
260 LINE(219,10)-(219,92),PSET
270 LINE(219,92)-(255,152),PSET
```



How the screen looks when you play Duck Shoot

```
280 FORI=1TO252 STEP18:FORU=1TO10:CIRCLE(10+1,10),
10,2,1,0,,5:NEXTU:NEXTI
290 PAINT(0,0),4,2
300 PAINT(0,151),3,2
310 PAINT(220,25),3,2
320 PAINT(40,99),4,2
330 COLOR1
350 TIMER=0:HT=0:SH=0:JO=JOYSTK(0)
360 FOR R=1 TO 15
370 RD=38:X=RND(3)+4
380 X1=RD:X2=RD:Y1=132:Y2=150
390 POKE&HFFD7,0:SCREEN1,0:FORI=46TO195 STEP X:PUT
(I,60)-(I+20,80),A,PSET
400 JO=JOYSTK(0)*2.8:LINE(X1+JO,Y1+JV)-(X2+JO,Y2+J
Y),PSET
410 FR=PEEK(65280)
420 IF FR=126 ORFR=254 THEN GOSUB490:SH=SH+1
430 IFSH)=10 THEN 590
440 COLOR1,4
450 LINE(X1+JO,Y1)-(X2+JO,Y2),PRESET
460 NEXTI:LINE(195,60)-(212,80),PSET,BF
470 NEXTR
480 GOTO590
490 EXEC32000
500 COLOR4,1
510 C=PPOINT(X1+JO,70)
520 IFC=2 THEN PUT(I,60)-(I+20,80),B,PSET:I=46:HT=
HT+1
530 RETURN
```

```
540 CLEAR 200,31999
550 FORI=1 TO 53:READ A$:Z=VAL("&H"+A$):POKE31999+
I,Z:NEXT
560 DATA 34,12,B6,FF,23,8A,08,B7,FF,23,7F,01,47,8E
,B7,98,A6,80,8D,14,A6,80
570 DATA 8D,10,7A,01,47,26,F3,B6,FF,23,84,F7,B7,FF
,23,35,12,39,B4,01,47,B7,FF,20,86,41,4A,26,FD,39,0
0,00
580 GOTO40
590 CLS:SCREEN 0,1
600 PRINT@10,"DUCK SHOOT"
610 PRINT@42,"---- -----"
620 PRINT@200,"YOUR SCORE IS ";HT
630 PRINT@264,"WITH ";SH;"SHOTS"
640 PRINT@328,"IN ";INT (TIMER/60);"SECONDS"
650 PRINT@419,"PRESS ANY KEY TO CONTINUE"
660 EXEC&1194
670 GOTO350
680 SCREEN0,0:CLS
690 PRINT@10,"DUCK SHOOT":PRINT@42,"---- -----"
700 PRINT"INSTRUCTIONS FOR PLAY":PRINT
710 PRINT"THE JOYSTICK MOVES THEN FLASHINGGUN LEFT
 OR RIGHT"
720 PRINT:PRINT"THE BUTTON FIRES THE GUN,YOU","HAV
E 10 SHOTS AND THE DUCK WILL PASS ONLY 15 TIMES"
730 PRINT:PRINT"AT THE END OF THE GAME YOUR ","SCO
RE WILL BE PRINTED"
750 GOTO20
```



LYNDS

LOOK WHATS TURNED UP!

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Side 1

Side 1

Side 2

Side 2

Program name
Side 1

Program name
Side 1

Side 2

Side 2

Your free inlays — just cut them out and place them inside your cassette boxes. They're ideal for recording your own programs and the listings you type in from Home Computing Weekly. Drawings by Chris Adam-Smith

You're a film producer, thanks to the computer

Link your computer and a video recorder and you can create some great graphics and sound effects on the screen. Brian Hughes shows you how

If you have seen the Walt Disney film Tron you will know how animation can be created by computers.

Each frame of the film was composed of millions of pixels, using huge mainframe computers.

The Dragon's maximum of 49152 pixels seems meek in comparison, but they can still be used to great effect if you have an ordinary home video recorder.

The diagram shows how to set up the video so it will record pictures from the computer.

Make sure first that you have enough mains sockets within easy reach — and don't overload any one socket

Set up the computer and video recorder as usual, then take the aerial lead out of the video and in its place put the computer's TV lead. Any picture or sound that is transferred to your usual TV can also be transferred to a video recorder.

Try taping an arcade game. You can analyse it to find your weak points and improve your ability at the game.

Although you probably haven't noticed it yet, you have already witnessed one of the advantages the Dragon has over its rivals. channelled sound.

Most other computers, like the Spectrum and the Oric, produce sound internally and do not transfer it to the TV. As a result, it would also not be transmitted to the video recorder.

Using a computer like the Dragon, you could channel prerecorded sounds from an audio cassette to a video cassette very easily.

This can be used to add sound effects to an animated sequence, or to add music to a home-made pop video.

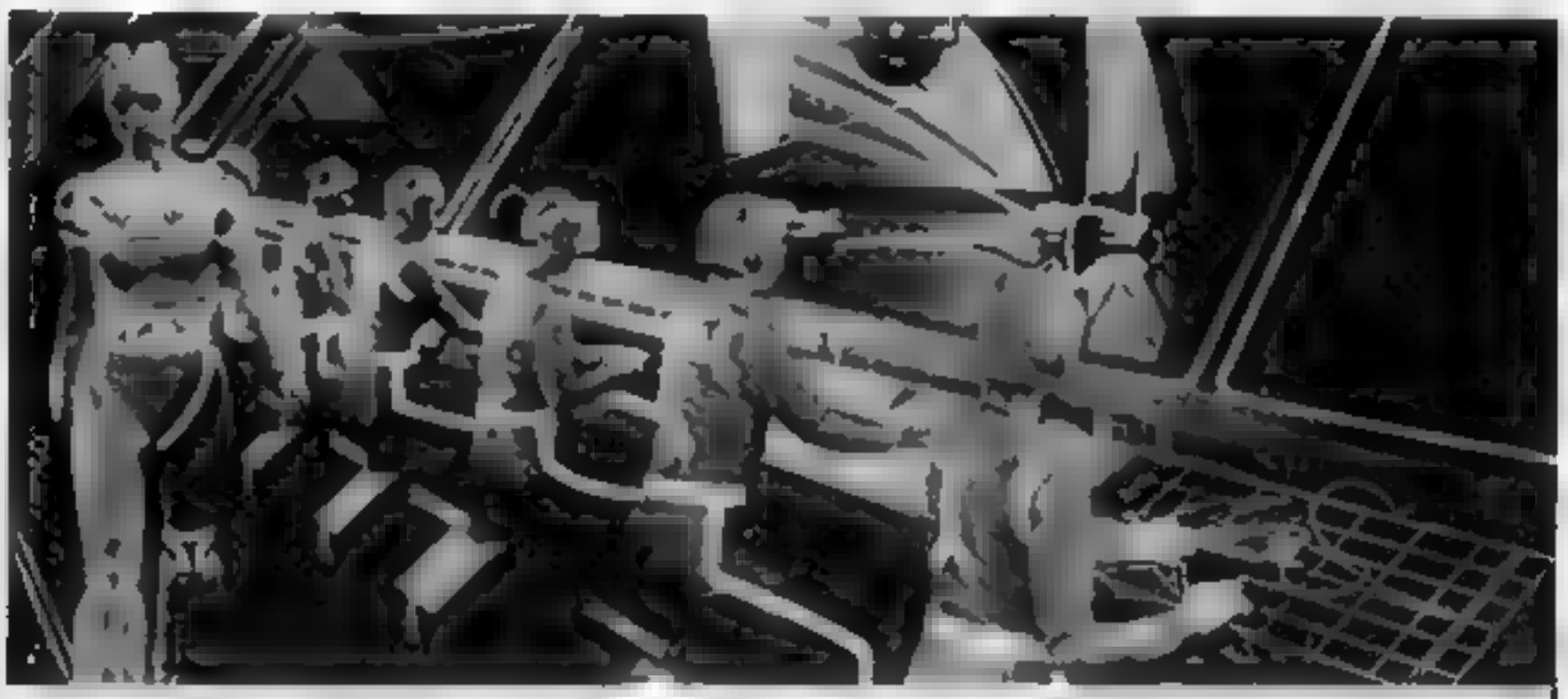
Here is how to add sounds to animation using the Dragon:

1 Record the sound effects on a cassette tape
2 Set up the video recorder and computer as I've described
3 Load or tape the program for the sequence.
4 Type AUDIOON:-MOTORON:RUN. Do not press enter yet
5 Find the recorded effects on the cassette and press play (the tape recorder should not start until the enter key has been pressed)
6 Press record/play on the video recorder and press the enter key on the computer

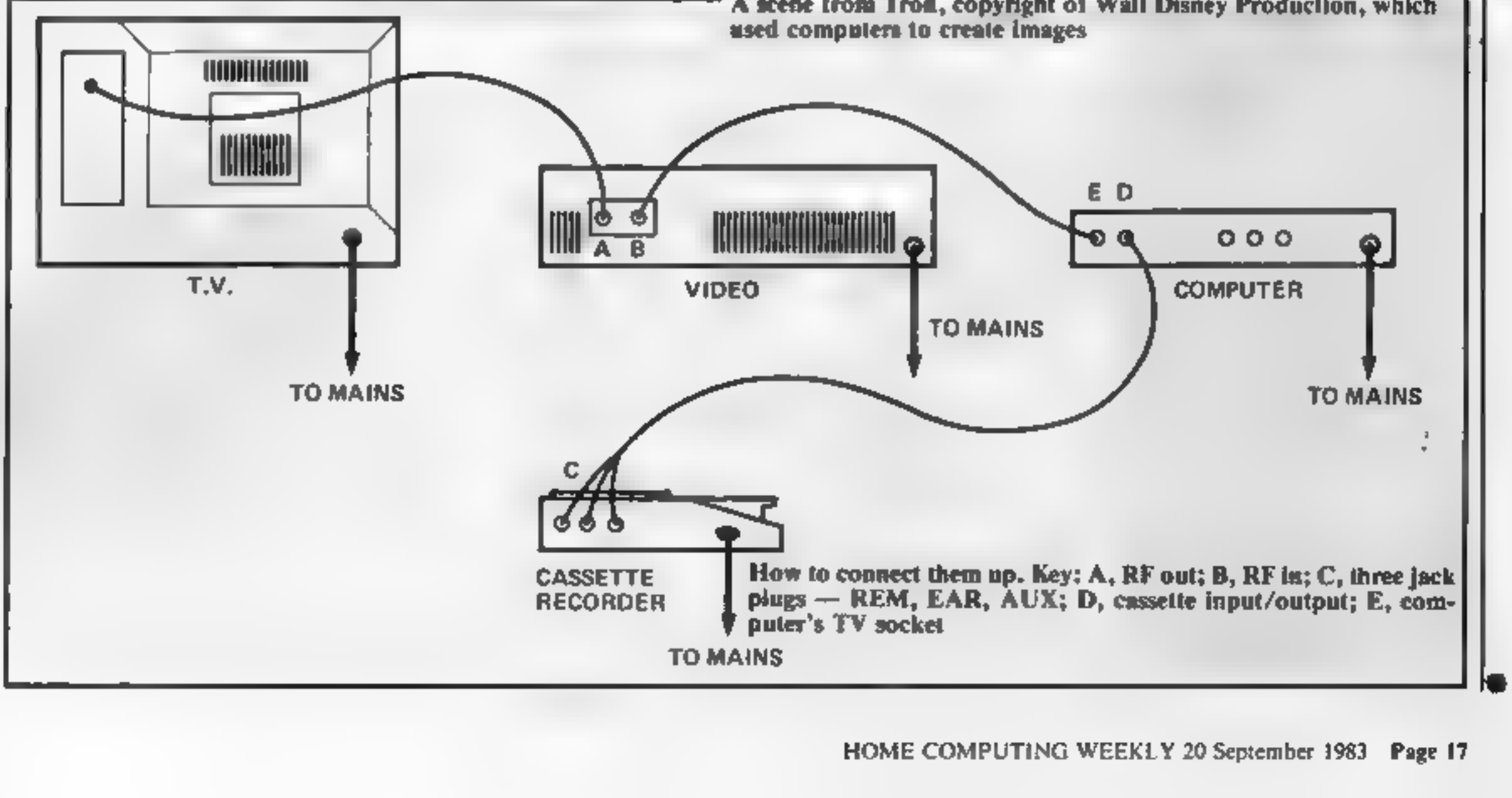
The program will now be taped on the video recorder with the sound effects added.

In my opinion, the best use of this technique is for the credits and titles at the beginning and end of a film.

However, a really enthusiastic film maker could take over where Disney left off.



A scene from Tron, copyright of Walt Disney Production, which used computers to create images



How to connect them up. Key: A, RF out; B, RF in; C, three jack plugs — REM, EAR, AUX; D, cassette input/output; E, computer's TV socket

It's your move — against the Spectrum

Try to get a row of four before the computer does, in David Haworth's game of strategy for any Spectrum

My game is a relaxed alternative to the usual shoot-em-up computer games. No fast reactions are required — all you need is logic.

The game is played in a seven by six array, and the first player to get four squares in a row — either horizontally, vertically or diagonally — wins.

The computer has first move, to compensate for its inferior intelligence. Its moves are printed as O and yours are printed as X.

As you play, the computer's skill level will reflect your own skill level in understanding the logic of the game and translating it into computer logic.

Unfortunately, in the 16K Spectrum there wasn't enough memory for all the logic I wanted to include. If you have the 48K version, there is plenty of scope to extend the program between lines 2940 and 3950.

In particular, I would suggest logic to make the computer play a more attacking game, and logic to stop the computer from making random moves which are advantageous to its human opponent.

You could also improve the graphics, colour and sound.

How it works

The game is played in an array a(m,n), where m denotes the column and n the row number, counting from the bottom row. Each element in the array can have one of three values: +1 (occupied by the computer), −1 (occupied by the human player) and 0 (empty).

A winning row of 4 in any direction will therefore total +4 or −4. If the computer has won, and −4 if the player has won. A total of +3 or −3 in any row of four elements indicates a potential winning move by the computer and human respectively.

Block by block, this is how the program works:

1-3 assigns values to the variables used in the program. These remain fixed values, used to avoid use of numbers in program lines.

5-7 print column numbers on screen

10-70 direct the program through the various subroutines in the proper sequence

1000-2940 subroutine to determine the computer's move, by calculating the sum of all combinations of four elements in a row within the array.

If this is three, then a potential winning move is indicated. If the vacant space is on the bottom row, the computer occupies it and wins.

If on higher rows, it first checks to see if the space below is occupied to determine if a winning move is possible.

In 2000-2620 it checks to see if a blocking move is required. This is a similar routine to the one above, except the check is for a total of −3 in any row of four.

If no winning or blocking move has been found, the program proceeds to 2700-2940, which will complete any line of two moves, for either computer or human, in the horizontal or vertical directions.

If no planned move is found, the program jumps to 3950 to make a random move.

3950-3980 subroutine to determine random move for computer

5000-5270 subroutine to check if game has been won

6000-6120 subroutine to get player's move (print eight spaces in line 6070)

8000-8100 sets up array and draws frame. Note: CODE "FN" = 168; CODE "=" = 39; CODE "CAT" = 207

9000-9120 end of game

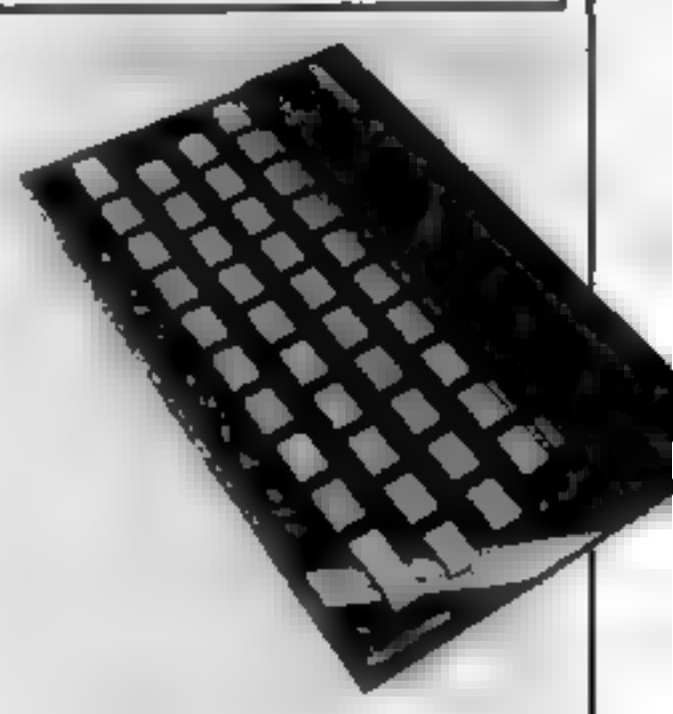
Variables

a	1
b	2 and so on until
g	7
z	0
k	7000
l	9000
p	9100
v	60 (note CODE "('less than' sign)" = 60

Hints on conversion

The program is written in simple BASIC with a minimum of graphics so conversion to other computers should be straightforward.

```
  1 LET a=VAL "1": LET b=VAL "2": LET c
=VAL "3": LET d=VAL "4": LET e=VAL "5":
LET f=VAL "6"
  2 LET g=VAL "7": LET z=VAL "0"
  3 LET k=VAL "7e3": LET l=VAL "9e3": L
ET p=VAL "9100"
  4 CLS
  5FOR x=a TO g
  6 PRINT AT z,c+c*x;x
  7 NEXT x
  8 LET v=CODE "<"
 10 GO SUB VAL "8e3"
 15 GO SUB VAL"3950"
 17 GO SUB k
 20 GO SUB VAL "6e3"
 25 GO SUB k
 30 GO SUB VAL "5e3"
 40 GO SUB VAL "1e3"
 50 GO SUB k
 70 GO TO VAL "20"
1000 BEEP a/g,e
1001 FOR m=a TO d
1010 IF a(m,a)+a(m+a,a)+a(m+b,a)+a(m+c,a
)=e THEN GO TO VAL "1030"
1020 NEXT m
1025 GO TO VAL "1070"
1030 IF a(m,a)=z THEN LET a(m,a)=a: GO S
UB k: GO TO p
1040 IF a(m+a,a)=z THEN LET a(m+a,a)=a:
GO SUB k: GO TO p
1050 IF a(m+b,a)=z THEN LET a(m+b,a)=a:
GO SUB k: GO TO p
1060 IF a(m+c,a)=z THEN LET a(m+c,a)=a:
GO SUB k: GO TO p
1070 FOR m=a TO d
1080 FOR n=b TO f
1090 IF a(m,n)+a(m+a,n)+a(m+b,n)+a(m+c,n
)=e THEN GO SUB VAL "1130"
1100 NEXT n
1110 NEXT m
1120 GO TO VAL "1170"
```



```
1130 IF a(m,n)=z AND a(m,n-a)<>z THEN LE
T a(m,n)=a: GO SUB k: GO TO p
1140 IF a(m+a,n)=z AND a(m+a,n-a)<>z THE
N LET a(m+a,n)=a: GO SUB k: GO TO p
1150 IF a(m+b,n)=z AND a(m+b,n-a)<>z THE
N LET a(m+b,n)=a: GO SUB k: GO TO p
1160 IF a(m+c,n)=z AND a(m+c,n-a)<>z THE
N LET a(m+c,n)=a: GO SUB k: GO TO p
1165 RETURN
1166BEEP a/9,a
1170 FOR m=a TO g
1180 FOR n=a TO c
1190 IF a(m,n)+a(m,n+a)+a(m,n+b)+a(m,n+c
)=c THEN GO TO VAL "1220"
1200 NEXT n
1210 NEXT m
1215 GO TO VAL "1230"
1220 LET a(m,n+c)=a: GO SUB k: GO TO p
1230 FOR m=a TO d
1240 FOR n=b TO c
1250 IF a(m,n)+a(m+a,n+a)+a(m+b,n+b)+a(m
+c,n+c)=c THEN GO SUB VAL "1290"
1260 NEXT n
1270 NEXT m
1280 GO TO VAL "1340"
1300 IF a(m,n)=z AND a(m,n-a)<>z THEN LE
T a(m,n)=a: GO SUB k: GO TO p
1310 IF a(m+a,n+a)=z AND a(m+a,n)<>z THE
N LET a(m+a,n+a)=a: GO SUB k: GO TO p
1320 IF a(m+b,n+b)=z AND a(m+b,n+a)<>z T
HEN LET a(m+b,n+b)=a: GO SUB k: GO TO p
1330 IF a(m+c,n+c)=z AND a(m+c,n+b)<>z T
HEN LET a(m+c,n+c)=a: GO SUB k: GO TO p
1335 RETURN
1340FOR m=d TO g
1350 FOR n=b TO c
1360 IF a(m,n)+a(m-a,n+a)+a(m-b,n+b)+a(m
-c,n+c)=c THEN GO SUB VAL "1400"
1370 NEXT n
1380 NEXT m
1390 GO TO VAL "1450"
1410 IF a(m,n)=z AND a(m,n-a)<>z THEN LE
T a(m,n)=a: GO SUB k: GO TO p
1420 IF a(m-a,n+a)=z AND a(m-a,n)<>z THE
N LET a(m-a,n+a)=a: GO SUB k: GO TO p
1430 IF a(m-b,n+b)=z AND a(m-b,n+a)<>z T
HEN LET a(m-b,n+b)=a: GO SUB k: GO TO p
1440 IF a(m-c,n+c)=z AND a(m-c,n+b)<>z T
HEN LET a(m-c,n+c)=a: GO SUB k: GO TO p
1445 RETURN
1450FOR m=a TO d
1460 IF a(m,a)+a(m+a,b)+a(m+b,c)+a(m+c,d
)=c THEN GO SUB VAL "1490"
1470 NEXT m
1480 GO TO VAL "1540"
1490 IF a(m,a)=z THEN LET a(m,a)=a: GO S
UB k: GO TO p
```

```
1500 IF a(m+a,b)=z AND a(m+a,a)<>z THEN
LET a(m+a,b)=a: GO SUB k: GO TO p
1510 IF a(m+b,c)=z AND a(m+b,b)<>z THEN
LET a(m+b,c)=a: GO SUB k: GO TO p
1520 IF a(m+c,d)=z AND a(m+c,c)<>z THEN
LET a(m+c,d)=a: GO SUB k: GO TO p
1530 RETURN
1540FOR m=d TO g
1550 IF a(m,a)+a(m-a,b)+a(m-b,c)+a(m-c,d
)=c THEN GO SUB VAL "1580"
1560 NEXT m
1570 GO TO VAL "1630"
1580 IF a(m,a)=z THEN LET a(m,a)=a: GO S
UB k: GO TO p
1590 IF a(m-a,b)=z AND a(m-a,a)<>z THEN
LET a(m-a,b)=a: GO SUB k: GO TO p
1600 IF a(m-b,c)=z AND a(m-b,b)<>z THEN
LET a(m-b,c)=a: GO SUB k: GO TO p
1610 IF a(m-c,d)=z AND a(m-c,c)<>z THEN
LET a(m-c,d)=a: GO SUB k: GO TO p
1620 RETURN
2000BEEP a/g,c
2001 FOR m=a TO d
2010 IF a(m,a)+a(m+a,a)+a(m+b,a)+a(m+c,a
)=-c THEN GO TO VAL "2030"
2020 NEXT m
2025 GO TO VAL "2070"
2030 IF a(m,a)=z THEN LET a(m,a)=a: GO S
UB k: GO TO v
2040 IF a(m+a,a)=z THEN LET a(m+a,a)=a:
GO SUB k: GO TO v
2050 IF a(m+b,a)=z THEN LET a(m+b,a)=a:
GO SUB k: GO TO v
2060 IF a(m+c,a)=z THEN LET a(m+c,a)=a:
GO SUB k: GO TO v
2070 FOR m=a TO d
2080 FOR n=b TO f
2090 IF a(m,n)+a(m+a,n)+a(m+b,n)+a(m+c,n
)=-c THEN GO SUB VAL "2130"
2100 NEXT n
2110 NEXT m
2120 GO TO VAL "2170"
2130 IF a(m,n)=z AND a(m,n-a)<>z THEN LE
T a(m,n)=a: GO SUB k: GO TO v
2140 IF a(m+a,n)=z AND a(m+a,n-a)<>z THE
N LET a(m+a,n)=a: GO SUB k: GO TO v
2150 IF a(m+b,n)=z AND a(m+b,n-a)<>z THE
N LET a(m+b,n)=a: GO SUB k: GO TO v
2160 IF a(m+c,n)=z AND a(m+c,n-a)<>z THE
N LET a(m+c,n)=a: GO SUB k: GO TO v
2165 RETURN
2170FOR m=a TO g
2180 FOR n=a TO c
2190 IF a(m,n)+a(m,n+a)+a(m,n+b)+a(m,n+c
)=-c THEN GO TO VAL "2220"
2200 NEXT n
2210 NEXT m
2215 GO TO VAL "2230"
```

```
2220 LET a(m,n+o)=a: GO SUB k: GO TO v
2230 FOR m=a TO d
2240 FOR n=b TO c
2250 IF a(m,n)+a(m+a,n+a)+a(m+b,n+b)+a(m
+c,n+c)=-o THEN GO SUB VAL "2290"
2260 NEXT n
2270 NEXT m
2280 GO TO VAL "2340"
2300 IF a(m,n)=z AND a(m,n-a)<>z THEN LE
T a(m,n)=a: GO SUB k: GO TO v
2310 IF a(m+a,n+a)=z AND a(m+a,n)<>z THE
N LET a(m+a,n+a)=a: GO SUB k: GO TO v
2320 IF a(m+b,n+b)=z AND a(m+b,n+a)<>z T
HEN LET a(m+b,n+b)=a: GO SUB k: GO TO v
2330 IF a(m+c,n+c)=z AND a(m+c,n+b)<>z T
HEN LET a(m+c,n+c)=a: GO SUB k: GO TO v
2335 RETURN
2340FOR m=d TO g
2350 FOR n=b TO c
2360 IF a(m,n)+a(m-a,n+a)+a(m-b,n+b)+a(m
-c,n+c)=-o THEN GO SUB VAL "2400"
2370 NEXT n
2380 NEXT m
2390 GO TO VAL "2450"
2410 IF a(m,n)=z AND a(m,n-a)<>z THEN LE
T a(m,n)=a: GO SUB k: GO TO v
2420 IF a(m-a,n+a)=z AND a(m-a,n)<>z THE
N LET a(m-a,n+a)=a: GO SUB k: GO TO v
2430 IF a(m-b,n+b)=z AND a(m-b,n+a)<>z T
HEN LET a(m-b,n+b)=a: GO SUB k: GO TO v
2440 IF a(m-c,n+c)=z AND a(m-c,n+b)<>z T
HEN LET a(m-c,n+c)=a: GO SUB k: GO TO v
2445 RETURN
2450FOR m=a TO d
2460 IF a(m,a)+a(m+a,b)+a(m+b,c)+a(m+c,d
)=-o THEN GO SUB VAL "2490"
2470 NEXT m
2480 GO TO VAL "2540"
2490 IF a(m,a)=z THEN LET a(m,a)=a: GO S
UB k: GO TO v
2500 IF a(m+a,b)=z AND a(m+a,a)<>z THEN
LET a(m+a,b)=a: GO SUB k: GO TO v
2510 IF a(m+b,c)=z AND a(m+b,b)<>z THEN
LET a(m+b,c)=a: GO SUB k: GO TO v
2520 IF a(m+c,d)=z AND a(m+c,c)<>z THEN
LET a(m+c,d)=a: GO SUB k: GO TO v
2530 RETURN
2540FOR m=d TO g
2550 IF a(m,a)+a(m-a,b)+a(m-b,c)+a(m-c,d
)=-o THEN GO SUB VAL "2580"
2560 NEXT m
2570 GO TO VAL "2630"
2580 IF a(m,a)=z THEN LET a(m,a)=a: GO S
UB k: GO TO v
2590 IF a(m-a,b)=z AND a(m-a,a)<>z THEN
LET a(m-a,b)=a: GO SUB k: GO TO v
2600 IF a(m-b,c)=z AND a(m-b,b)<>z THEN
LET a(m-b,c)=a: GO SUB k: GO TO v
2610 IF a(m-c,d)=z AND a(m-c,c)<>z THEN
LET a(m-c,d)=a: GO SUB k: GO TO v
2620 RETURN
2700FOR m=b TO d
2710 IF ABS (a(m,a)+a(m+a,a)+a(m+b,a))=2
 THEN GO TO VAL "2740"
2720 NEXT m
2730 GO TO VAL "2800"
2740 IF a(m,a)=z THEN LET a(m,a)=a: GO S
UB k: GO TO v
2750 IF a(m+a,a)=z THEN LET a(m+a,a)=a:
GO SUB k: GO TO v
2760 IF a(m+b,a)=z THEN LET a(m+b,a)=a:
GO SUB k: GO TO v
2800 FOR m=b TO d
2805 FOR n=b TO f
2810 IF ABS (a(m,n)+a(m+a,n)+a(m+b,n))=2
 THEN GO SUB VAL "2840"
2820 NEXT n
2825 NEXT m
2830 GO TO VAL "2900"
2840 IF a(m,n)=z AND a(m,n-a)<>z THEN LE
T a(m,n)=a: GO SUB k: GO TO v
2850 IF a(m+a,n)=z AND a(m+a,n-a)<>z THE
N LET a(m+a,n)=a: GO SUB k: GO TO v
2860 IF a(m+b,n)=z AND a(m+b,n-a)<>z THE
N LET a(m+b,n)=a: GO SUB k: GO TO v
2870 RETURN
2900FOR m=a TO g
2910 FOR n=a TO c
2920 IF ABS (a(m,n)+a(m,n+a)+a(m,n+b))=b
 THEN LET a(m,n+b)=a: GO SUB k: GO TO v
2930 NEXT n
2940 NEXT m
3950 LET m=a+INT (RND*g)
3960 LET n=a
3965 IF n=g THEN GO TO VAL "3950"
3970 IF a(m,n)<>z THEN LET n=n+a: GO TO
VAL "3965"
3975 LET a(m,n)=a
3980 RETURN
5000FOR m=a TO g
5010 FOR n=a TO c
5020 LET s=a(m,n)+a(m,n+a)+a(m,n+b)+a(m,
n+c)
5030 IF s=d THEN GO TO p
5040 IF s=-d THEN GO TO l
5050 NEXT n
5060 NEXT m
5065 BEEP a/g,c
5070 FOR m=a TO d
5080 FOR n=a TO f
5090 LET s=a(m,n)+a(m+a,n)+a(m+b,n)+a(m+
c,n)
5100 IF s=d THEN GO TO p
5110 IF s=-d THEN GO TO l
5120 NEXT n
```

SPECTRUM PROGRAM

```
5130 NEXT m
5140 FOR m=a TO d
5150 FOR n=a TO c
5160 LET s=a(m,n)+a(m+a,n+a)+a(m+b,n+b)+
a(m+c,n+c)
5170 IF s=d THEN GO TO p
5180 IF s=-d THEN GO TO l
5190 NEXT n
5195 NEXT m
5200 FOR m=d TO 9
5210 FOR n=a TO c
5220 LET s=a(m,n)+a(m-a,n+a)+a(m-b,n+b)+
a(m-c,n+c)
5230 IF s=d THEN GO TO p
5240 IF s=-d THEN GO TO l
5250 NEXT n
5260 NEXT m
5270 RETURN
6000BEEP a,z
6001 INPUT "Your move (col)";a$
6010 LET m=VAL a$(1)
6020 IF m<a OR m>9 THEN BEEP .5,0: GO TO
 VAL "6000"
6030 LET n=a
6040 IF n=9 THEN GO TO VAL "6090"
6050 IF a(m,n)<>z THEN LET n=n+a: GO TO
VAL "6040"
6060 LET a(m,n)=-a
6070 PRINT AT 21,0;"
6080 RETURN
6090PRINT AT 21,0;"Col Full"
6110 BEEP .5,10
6120 GO TO VAL "603"
7000 FOR m=a TO 9
7010 FOR n=a TO f
7020 IF a(m,n)=a THEN PRINT AT n*(-c)+21
,m*c+c;"O": BEEP a/e,b*m
7025 IF a(m,n)=-a THEN PRINT AT n*(-c)+2
1,m*c+c;"X": BEEP a/e,b*m
7030 IF a(m,n)=z THEN PRINT AT n*(-c)+21
,m*c+c;" "
7040 NEXT n
7060 NEXT m
7070 RETURN
8000DIM a(9,f)
8020 FOR i=CODE "!" TO CODE " CAT " STEP
 VAL "24"
8030 PLOT i,16
8040 DRAW z,VAL "144"
8050 NEXT i
8060 FOR J=16 TO VAL "160" STEP VAL "24"
8070 PLOT CODE "!",J
8080 DRAW CODE "FN ",z
8090 NEXT J
8100 RETURN
9000PRINT "You win"
9005 BEEP b,z: BEEP b,b: BEEP a,c: BEEP
a,b: BEEP b,z
9010 GO TO VAL "9105"
9100 PRINT "I win"
9102 BEEP a,12: BEEP a,z
9105 INPUT "Another Game?";a$
9110 IF a$(1)="y" THEN RUN
9120CLS
```

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Dig for a fortune in gems

Glittering prizes await you in Jewel Mining, a game for the TI-99/4A by James Wilson. But first you must avoid the hazards . . . and beat the clock

You'll find out just how dangerous mining can be when you play my game for the unexpanded TI-99/4A.

To reach the jewels you must avoid falling rocks and hammers, open mine shafts. . .and the Mine Guardians. And you have to reach the top before the timer counts down to zero.

After the instructions are displayed there will be a pause while the array holding the positions of the rocks is built up.

Then the screen will clear and the course will be displayed, consisting of a counter in the bottom left, a cave containing the three jewels in the bottom centre and, a passageway across the bottom of the screen with a Mine Guardian at each end.

In the top right will be an open space containing a man and a number telling you whether he is miner 1, 2 or 3.

You move your man using the arrow keys, plus those between them for diagonal movement. He collects a jewel by dropping onto it and must then return to the open space above.

Whatever the result, the course is reset and you may then try for the next jewel.

If your man successfully recovers all three jewels, you will be given a score and asked if you wish to play again. You will be given the same option if your man fails to survive but, of coruse, there will be no score.

The game can be made easier or more difficult by changing certain values:

390 if the numeric value 1.16 is increased more rocks will appear, up to a maximum of 15 per line

570 if the limit value of the FOR-NEXT loop is increased more men will be available.

1060-1080 the ASCII codes for the counter numbers could be changed to give more or less time

2010 if the numeric value 1.14 is decreased the lasers are less likely to fire and the opposite is also true

2110 changing the figure 1.16 will increase or decrease the likelihood of hammers dropping

Here are a couple of points of interest about the program.

TI BASIC does not support AND/OR statements. However, these can be initiated by enclosing the relational expressions in brackets and using the plus sign for OR and the multiplication sign for AND, as in line 1500 (AND) or in line 1480 (OR).

In lines 1300 and 1310 the new values of I and J are calculated thus: the expressions in brackets — for example (KK = 69 — will be given a value of zero if they are false or a value of minus one if they are true.

Consequently, adding all these values together, then adding them to the values of Y and X gives new values for I and J

Variables

In the interest of saving memory, several variables are used for different purposes

N controls several FOR NEXT loops, return variable for GCHAR statements, to detect mine shafts, walls and to timer operating loop

/ is used in several FOR NEXT loops, counter in building array holding rocks and in displaying rocks, row number in DISPLAY AT sub-routine

RT holds best (lowest) score

I/J row column position when displaying rocks or new row/column position when moving man

Y/X old row/column position when moving man

M+N number of men

Q start column location in DISPLAY AT sub-routine

JF number of jewels "in transit"

RK return variable in GCHAR statement to detect rock above man's new position

MAN holds ASCII code of man moving left or right

TT score in current game

KK holds ASCII code of key pressed

SS status variable, detects whether key was pressed in CALL KEY statement

P holds ASCII code of space man will leave behind

RV/RH vertical/horizontal locations of a rock above man's new position

W$ string variable to hold character code in READ statement, or holds message in DISPLAY AT sub-routine

R(316), S(6,3), G(3,2) arrays holding positions of rocks, mine shafts, jewels

```
 90 REM  JEWEL MINING
 91 REM
100 CALL SCREEN(8)
110 PRINT TAB(5);"JEWEL MINING";TAB(5);"------------"
120 PRINT "  YOU HAVE THREE MEN TO DIG"    "  DOWN TO THE CAVE BELOW"
130 PRINT "    AND RETURN THE THREE"      "    GEMS ONE AT A TIME"
140 PRINT TAB(8)"TO THE SURFACE"    " BEWARE OF FALLING ROCKS AND"
150 PRINT "  HAMMERS THE MINE GUARDIANS"    "  AND THE OPEN MINE SHAFTS"
160 PRINT "    DON'T LET THE TIMER RUN"    "  TO ZERO OR YOU WILL DIE"
170 PRINT " USE KEYS W E R S D F X C TO"    " MOVE THE MAN LEFT RIGHT "
180 PRINT "  UP DOWN AND DIAGONALLY"    "  HANG ON FOR ONE MINUTE"
```

```
190 FOR M=1 TO 3
200 CALL COLOR(M,10,2)
210 NEXT M
220 FOR N=1 TO 12
230 READ Z,W$
240 CALL CHAR(Z,W$)
250 NEXT N
260 CALL COLOR(13,15,2)
270 CALL COLOR(14,7,2)
280 CALL COLOR(15,14,15)
290 CALL COLOR(16,4,2)
300 DIM R(316),S(6,3),G(3,2)
310 HT=9
320 GOTO 350
330 CALL CLEAR
340 GOSUB 2830
350 RANDOMIZE
360 Z=1
370 FOR I=1 TO 21
380 FOR J=2 TO 32
390 IF RND>1.16^I THEN 430
400 R(Z)=J+32*(I-1)
410 Z=Z+1
420 IF Z>I*15 THEN 440
430 NEXT J
440 NEXT I
450 R(316)=Z
460 FOR Z=1 TO 6
470 S(Z,1)=INT(RND*14)+1
480 S(Z,2)=INT(RND*25)+3
490 S(Z,3)=INT(RND*3)+2
500 NEXT Z
510 FOR Z=1 TO 3
520 G(Z,1)=(Z*2)+10
530 G(Z,2)=24
```

```
540 NEXT Z
550 TT=0
560 CALL CLEAR
570 FOR MEN=1 TO 3
580 IF MEN=1 THEN 610
590 Z=24
600 GOSUB 2830
610 CALL HCHAR(1,1,128,784)
620 CALL VCHAR(1,1,32,24)
630 CALL HCHAR(23,3,133,29)
640 Z=1
650 FOR I=1 TO 21
660 IF Z=R(316)THEN 730
670 J=R(Z)-((I-1)*32)
680 IF J>32 THEN 720
690 CALL HCHAR(I,J,136)
700 Z=Z+1
710 GOTO 660
720 NEXT I
730 FOR Z=1 TO 6
740 CALL VCHAR(S(Z,1),S(Z,2),32,S(Z,3))
750 NEXT Z
760 CALL VCHAR(6,32,32,9)
770 CALL VCHAR(1,21,32,18)
780 CALL VCHAR(12,10,32,18)
790 FOR I=1 TO 4
800 CALL HCHAR(1,I*25,32,33-(25*I))
810 NEXT I
820 CALL HCHAR(20,12,132,5)
830 CALL HCHAR(21,12,153,5)
840 CALL HCHAR(22,12,32,5)
850 CALL HCHAR(23,12,32,5)
860 CALL VCHAR(20,11,132,4)
870 CALL VCHAR(20,17,132,3)
880 CALL HCHAR(22,10,128)
```

Hints on coversion

Conversion should not be too difficult on any home computer allowing user-defined characters Here are explanations of some commands in TI BASIC, all prefaced by the word CALL

CLEAR equivalent to CLS, places space character in all screen positions

SCREEN changes screen colour according to colour code

CHAR re-defines the standard ASCII characters according to a 16-place hexadecimal string code

COLOR sets colour of the character group in the format (character group, foreground colour, background colour)

HCHAR positions character and optionaly repeats it horizontaly in the format (row-number, column-number, ASCII code, number of repetitions)

VCHAR as for HCHAR, but repetition is vertically

GCHAR takes the format (row-number, column-number, return variable) and places the ASCII code of the character found in the specified position in the return variable

KEY places ASCII code of key pressed in the key variable, takes the format (key-unit, key variable, status variable) where status variable indicates whether or not a key was pressed

SOUND takes the format (duration, frequency, volume) where the duration is in milisecconds, frequency ranges from 110 to 44733 Hz, volume is 0-30 If a -ve frequency (1 to 8) is specified, a "white noise" is produced, if a -ve duration is specified, an immediate sound update is carried out when the next CALL SOUND statement is encountered Optionally, up to three frequencies and volumes may be specified in one CALL SOUND statement to produce chords.

The TI-99/4A uses a screen display of 24 vertical by 32 horizontal in the graphics mode, and 24x28 when printing words. Each square is further divided into an 8x8 matrix which is used for defining the characters

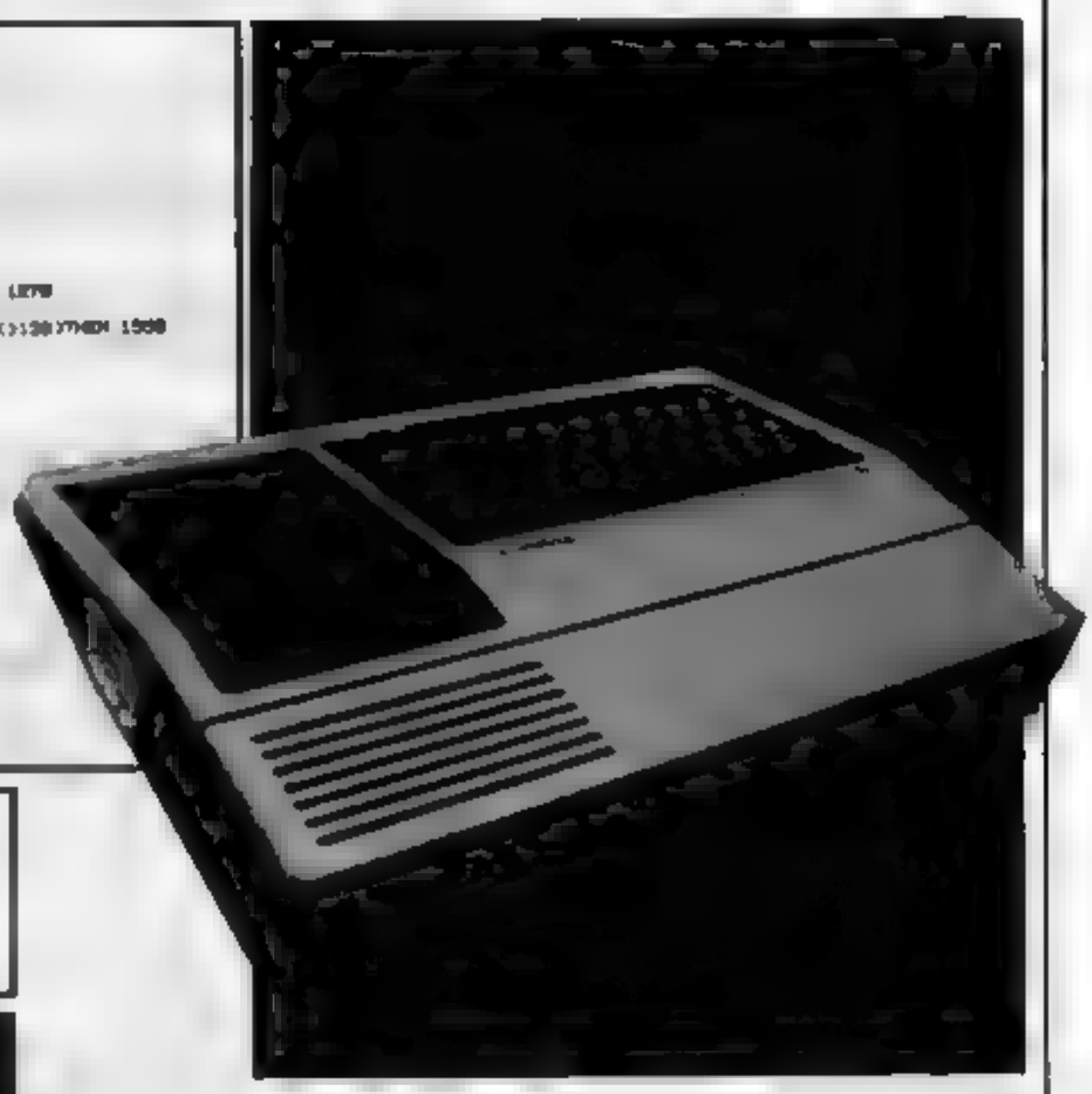
(KK 69) will be given a value of zero if they are false or a value of minus one if they are true

TI-99/4A PROGRAM

```
 890 CALL HCHAR(22,18,132)
 900 CALL HCHAR(24,2,132 31)
 910 CALL HCHAR(23,2 128
 920 CALL HCHAR(23 32 127)
 930 FOR Z=1 TO 3
 940 CALL HCHAR(G(Z*2),G(Z 1),139)
 950 NEXT Z
 960 MB="MAN "&STR$(MEN)
 970 Z=1
 980 G=26
 990 GOSUB 2650
1000 Z=0
1010 RK=0
1020 MAN=.28
1030 X=31
1040 Y=4
1050 CALL HCHAR(4 31 MAN)
1060 CALL HCHAR(24 3 49)
1070 CALL HCHAR(24 4 53)
1080 CALL HCHAR(24 5 48)
1090 FOR Z=1 TO 3
1100 CALL KEY(0,KK,SS)
1110 T=T+1
1120 CALL GCHAR(24 5 N)
1130 IF N=48 THEN 1160
1140 CALL HCHAR(24 5 N-1
1150 GOTO 1250
1160 CALL GCHAR(24 4 N)
1170 IF N=48 THEN 1210
1180 CALL HCHAR(24 3 57)
1190 CALL HCHAR(24 4,N-1
1200 GOTO 1250
1210 CALL GCHAR(24 3,N)
1220 IF N=48 THEN 2270
1230 CALL HCHAR(24 4 57,2)
1240 CALL HCHAR(24 3,N-1)
1250 IF RK<>0 THEN 1290
```

```
1260 NEXT Z
1270 IF RK=136 THEN 1840
1280 IF Y>22 THEN 2660 ELSE 1300
1290 P=32
1300 I=Y+(KK=69)+(KK=88)+(KK=67)+(KK=68)+(KK=83)+(KK=69)
1310 J=X+(KK=83)+(KK=68)+(KK=67)+(KK=83)+(KK=68)+(KK=87)
1320 IF J<>N THEN 1290
1330 IF I=Y THEN 1270
1340 IF (KK<>69)+(I=0)+(Y=24)THEN 1400
```

```
1350 CALL GCHAR(I J,N)
1360 IF N<>32 THEN 1400
1370 I=Y
1380 GOTO 1270
1390 P=136
1400 IF J<2 THEN 1440
1410 IF MAN=128 THEN 1480
1420 MAN=128
1430 GOTO 1460
1440 IF MAN=129 THEN 1480
1450 MAN=129
1460 CALL HCHAR(Y,X,MAN)
1470 GOTO 1270
1480 IF (I<1)+(I>24)+(J<2)+(J>32)THEN 1270
1490 CALL GCHAR(I J,N)
1500 IF N<>32+N<>136+N<>137+N<>128)THEN 1550
1510 CALL HCHAR(I J 144)
1520 CALL SOUND(50 -7 0)
1530 CALL HCHAR(I,J,N)
1540 GOTO 1270
1550 IF I>22 THEN 1580
1560 CALL HCHAR(I J 144)
1570 CALL SOUND(50 -7 0)
1580 CALL HCHAR(I J MAN)
1590 CALL HCHAR(Y,X P)
1600 Y=I
1610 X=J
1620 IF RK=136 THEN 1640
1630 IF Y>22 THEN 2660
1640 IF (Y>4)+(JE=0 THEN 1660
1650 IF N=Y>24 THEN 2270
1660 CALL GCHAR(I+1, J N)
1670 IF (N<>32)+(RK=69)THEN 1700
1680 Z=1760
1690 I=I+1
1700 CALL HCHAR(I J MAN)
1710 CALL HCHAR(Y X 32
1720 CALL SOUND(-500 2 2
```



```
1730 CALL GCHAR(I+1 J,N)
1740 IF (N<>32)+(N<>135)THEN 2270
1750 Z=Z-35
1760 Y=I
1770 GOTO 1630
1780 IF I=1 THEN 1890
1790 CALL GCHAR(I-1 J RK)
1800 IF RK<>136 THEN 1890
1810 RV=I-1
1820 RH=J
1830 GOTO 1890
1840 RK=RV
1850 CALL GCHAR(RV+1 RH N)
1860 CALL HCHAR(RV+1 RH 136)
1870 CALL HCHAR(RV RH 32)
1880 CALL SOUND(-1000 -3,2)
1890 IF RV=1 THEN 1940
1900 CALL GCHAR(RV-1 RH 2)
1910 IF Z<>136 THEN 1940
1920 RV=RV-1
1930 GOTO 1860
1940 IF MAN=MEN THEN 2270
1950 CALL GCHAR(RK+2 RH N)
1960 IF (N<>32)+(N<>128)+(N<>MAN)THEN 1630
1970 RV=RK+1
1980 CALL SOUND(-1000,-6 0)
1990 GOTO 1940
2000 IF (J>11)+(J<17)THEN 2060
2010 IF (RH=1 OR I=1 THEN 1890
2020 CALL SOUND(500 999 0)
2030 IF J<12 THEN 2060
2040 CALL HCHAR(23,J-1,32 32-J)
2050 GOTO 2270
2060 CALL HCHAR(23,J-1,32 J-2)
2070 GOTO 2270
2080 IF JE<>0 THEN 2110
2090 CALL HCHAR(23 17 128)
2100 CALL HCHAR(23 31 130)
2110 IF RH=1 OR I<>1 THEN 2240
2120 Q=INT(RND*5)+12
2130 FOR Z=22 TO 24
2140 CALL GCHAR(Z Q N)
2150 IF (N<>32)+(N<>128)THEN 2210
2160 CALL HCHAR(Z Q 152)
```

```
2170 CALL HCHAR(Z-1 Q 32)
2180 CALL SOUND(-200 INT(10000/Z),0)
2190 IF N=MAN THEN 2270
2200 NEXT Z
22 0 CALL SOUND(50 -7 0)
2220 CALL HCHAR(Z-1 Q 32)
2230 CALL HCHAR(Z1 Q 153)
2240 IF Y<24 THEN 1890
2250 JE=(K-8)/2
2260 GOTO 1890
2270 CALL SOUND(-999,-5 0)
2280 MB="YOUR MAN 8 DEAD"
2290 Z=12
2300 GOSUB 2940
23 0 NEXT MEN
2320 CALL SOUND(1000 110 3 220,3,330,1)
2330 MB="ALL YOUR MEN ARE DEAD"
2340 Z=10
2350 GOSUB 2940
2360 GOTO 2640
2370 G(JE 1)=32
2380 G(JE 2)=JE
2390 FOR Z=1 TO 11
2400 CALL SOUND(40,1000 3)
2410 NEXT Z
2420 MB="JEWEL "&STR$(JE)&" RETURNED"
2430 GOSUB 2940
2440 FOR I=1 TO 3
2450 IF G(I 1)<>32 THEN 500
2460 NEXT I
2470 CALL SOUND(200 370 4,550 4,294 4)
2480 CALL SOUND(400 494 3 550 3,350 3)
2490 CALL SOUND(200 494 2 550 2 350 2)
2500 CALL SOUND(600 370 1,550 1 470 1)
2510 IF MT<>0 THEN 2540
2520 MT=TT
2530 GOTO 2550
2540 IF MT>TT THEN 2520
2550 MB="WELL DONE,
2560 Z=8
2570 GOSUB 2940
2580 MB="YOU'VE RETURNED ALL 3 JEWELS"
2590 Z=10
2600 GOSUB 2940
```

```
2610 MB="YOUR SCORE "&STR$(TT)&" BEST SCORE "&STR$(MT)
2620 Z=12
2630 GOSUB 2940
2640 MB="DO YOU WANT TO PLAY AGAIN"
2650 Z=Z+2
2660 GOSUB 2940
2670 MB=" PRESS S FOR SAME SET-UP N FOR"
2680 Z=Z+2
2690 GOSUB 2940
2700 MB=" NEW SET-UP OR F TO FINISH"
2710 Z=Z+2
2720 GOSUB 2940
2730 Z=12
2740 CALL KEY(0 KK SS)
2750 IF SS=0 THEN 2740
2760 ON POS(" SNF" CHR$(KK),1)+1 GOTO 2740 510,280,2770
2770 CALL CLEAR
2780 MB="THANKS FOR PLAYING"
2790 GOSUB 2940
2800 FOR Z=1 TO 1500
2810 NEXT Z
2820 STOP
2830 MB="HANG ON FOR 1 MINUTE"
2840 D=16-INT(LEN(MB)/2)
2850 FOR M=1 TO LEN(MB)
2860 CALL HCHAR(2 D+M,ASC(SEG$(MB,M,1)))
2870 NEXT M
2880 RETURN
2890 DATA 120,3C3C3C3C1C1C343C,129,3C3C3C3C381C3C38,130,FFFFFFFFFFFFFFFF
2900 DATA 133,0000000000000000,135,183C7E7C3E3C7C38,137,03037F7F0F0F3F3F,138,C0C
0FCFCF8F8C0C0F8
2910 DATA 139,0000001838FC3C18,144,
```

How it works

100-210 screen color (black), print instructions and sets upper case letter colors.

220-250 define characters from DATA statements in lines 2890, 2900, 2910.

260-290 set colors of characters in CHARPAT arrays.

330-340 clear screen, print "wait" message for second and subsequent games.

350 seeds random number generator.

360-450 set array values holding random positions of rocks.

460-500 set array values holding position, depth of shafts.

510-540 set array values holding positions of jewels.

550-560 clear screen, set current game score to zero.

570 FOR NEXT loop controlling number of men.

590-600 display wait message.

610-950 display course.

960-990 display number of current men.

1000-1040 set game variables to start positions.

1050-1080 display man and counter at start positions.

1090 control loop for delay and key press.

1100 detects key pressed in variable KK.

1110 adds 1 to score.

1120-1130 operate on-screen counter.

1250 detects whether key was pressed.

1270-1280 check for rock detected in previous run through or for man in cave.

1290 & 1390 set value of P depending on key pressed.

1300-1310 set new values of I and J.

1320-1330 check if incorrect key pressed.

1340-1360 check to see if an open space is above old position if the man is moving up and stops the man if there is.

1390-1470 change direction of man.

1480 checks to see if man is at screen edge.

1490-1540 checks for rocks and walls in new position.

1550-1610 move man.

1620 checks if rock is set to fall.

1630 checks if man is in cave.

1640-1650 checks to see if man has returned with jewel.

1660-1770 checks for open mine shaft below man and drops man down shaft.

1780-1830 check for rock above new position.

1840-1900 falling rock routine.

2000 checks to see if man is in cave or passageway.

2010-2070 laser fire routine.

2080-2100 opens cave exit, closes cave entrance.

2110-2230 falling hammer routine.

2240-2260 checks to see which jewel is picked up.

2270-2310 dead man routine.

2320-2360 all men dead message.

2370-2460 returned jewel routine, checks to see if all three jewels returned.

2470-2560 messages for a win, compares current score with best score, displays best and current score.

2640-2720 messages to decide whether to play again.

2730-2820 CALL KEY routine to select whether or play again.

2830-2880 DISPLAY AT sub-routine.

2890-2910 DATA statements containing codes for defining characters.

Games to take home to the range

Our reviewers put on their Stetsons and tell you pardners about some Texas games on cassette and cartridge

Invasion TI-99/4A £5

Stainless Software, 10 Alstone Road, Stockport, Cheshire, SK4 5AH

Here you have the task of single-handedly defending your island from landing parties of enemy ships. The display on screen shows the coastline and your gun, which is strategically placed near the bottom in a bay.

The invasion force appears, one at a time, to the left of the screen and travel horizontally towards the shore

Using keyboard controls to move and fire, your gun is placed so as to blast each ship as it passes When one is hit, however, it leaves a shipwreck which forms a barrier to any further gunfire.

As the game progresses and more ships are destroyed direct hits become increasingly difficult. Should a ship land on your island the width of the bay in which your gun is placed becomes narrower. The game ends when either you accidentally crash into the bay or complete invasion is accomplished

A simple yet enjoyable game, well crashproofed and with some pleasing graphics, but it is one which you can never actually win.

The only goal is to achieve the highest score possible before you are ultimately stopped. Some comment on your performance at the end of each run might well make this more motivating. J.W.

instructions	80%
playability	60%
graphics	80%
value for money	60%

★ ★ ★

Hen House TI-99/4A £27.95 (cartridge)

Galaxy, 60 High Street, Maidstone, Kent

The player controls, using keyboard or joystick, a farmer who has two conflicting tasks — to catch eggs falling from a hen house and place them in a truck, while also shooting poachers and foxes (and the odd bird).

Points are scored for each bird or poacher shot, and the game ends when six eggs have been dropped. The pace of the game speeds up as you go along, but there is only one scenario; this could give the game limited playability.

Instructions are far too brief but adequate if you don't mind a little experimentation You pick the gun up and drop it by moving to screen left, and put the eggs in the lorry by moving to screen right.

The graphics are quite good, especially the animation of the farmer. S.S.

instructions	40%
playability	50%
graphics	80%
value for money	60%

★ ★ ★

Torpedo Alley/ Ascot Stakes TI-99/4A (Extended BASIC) £8.00

Lantern Software, 4 Haffenden Road, Tenterden TN30 6QD

Simple spelling mistakes in the instructions for both programs do little to improve them. While excellent use is made of graphics, interest is not sustained, and skill requirements are negligible (or absent in the case of Ascot Stakes).

Torpedo Alley has you launching two torpedoes simultaneously at three ships running the gauntlet between the rocks at night Only two degrees of difficulty are offered — easy or hard — the difference lying mainly in the game tempo.

The score is displayed as the 'time' counts up to 120. The game might well appeal to the very young or to those with poor hand-eye co-ordination

Ascot Stakes is graphically excellent, producing a television-type pan of the race, but there is no skill involved at all. Punters select their horses, place their bets (you start with £100) and the computer does the rest

You play until either all punters are broke or want to give up — you can't stop unless everybody else wants to!

This game is likely to appeal to only the very young Although providing two programs for the price, the cost is still very high P.B.

instructions	75%
playability	30%
graphics	90%
value for money	30%

★ ★

Core TI-99/4A £3.50

Christine Computing, 6 Florence Close, Watford, Herts.

Hidden deep in the earth is the core To reach it you have to complete all three stages of this game Firstly your craft descends through clouds, birds and aeroplanes and you have to navigate a clear path.

Secondly, after successfully through the sky you go underground negotiating the cave and caverns

It takes a little while to realise that there is only one way through but if you complete this the third part looms up and all that stands between you and the core is the 3D maze

After a number of frustrating attempts you should reach the core. A little light hearted relief will be found here.

If you collide with any part of the scenery your score and the highest so far is displayed along with an invite to play again but no score is given for a successful mission

Each new game is the same as the last, so once you have reached the core a few times there is very little incentive to play again.

I had no problem in loading this game and found the screen instructions clear, although the spelling of the word 'plains' for planes was a little ambiguous

The graphics are neat but colour would enhance the game.

C.E.

instructions	85%
playability	50%
graphics	50%
value for money	50%

★ ★ ★

Rabbit Trail TI-99/4A £27.95 (cartridge)

Galaxy, 60 High Street, Maidstone, Kent

The screen shows a rabbit run. You are the bunny — very nice graphics here. You must hop along your rabbit run collecting carrots and avoiding some nasty creatures that seem to like rabbits

The screen display seems to be a rabbit warren, but on the basis that hawks don't usually fly underground, I assume it must be meant to be a rabbit run, or a series of runs connected by tunnels.

There are seven screens to try your hand at, and the game is against the clock.

Graphics are good, and the game scores highly for originality and lack of violence (provided you avoid the predators).

Enjoyable. But owners of the 99/4 should note that this module will only run on the 99/4A! S.S.

instructions	50%
playability	80%
graphics	95%
value for money	80%

★ ★ ★ ★

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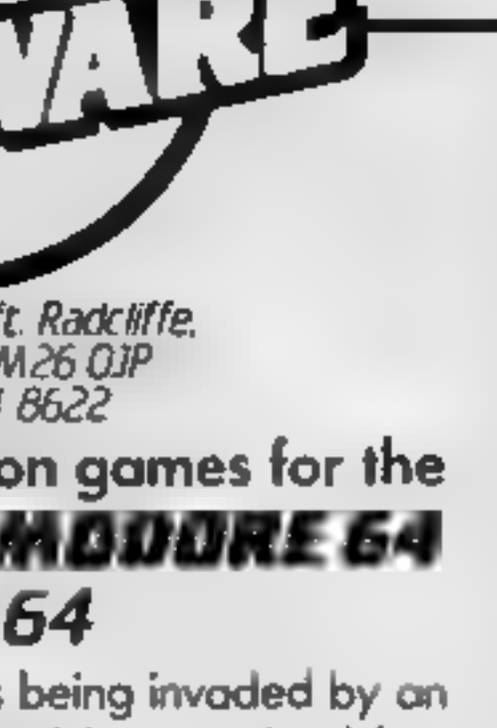

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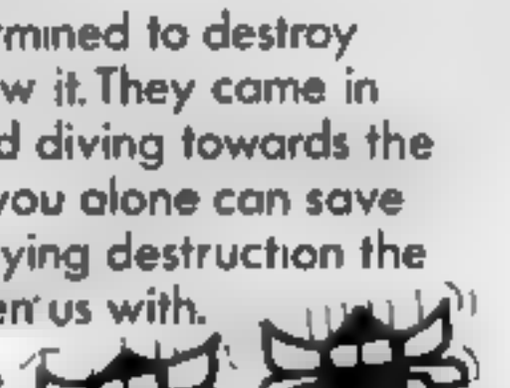

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EXPORT ENQUIRES WELCOME

COMMODORE 64 PROGRAM

Space hazards come in all shapes and sizes

Packed with action and several varieties of danger, Richard Gibbs' program for the Commodore 64 offers a real challenge. There are up to 31 skill levels

How it works
1-8 set up variables
9 reads sprite data
11-148 sprite data
150-270 introduction
290-568 rocket attack
570-770 refuelling stage
[illegible] scene
1000-3040 alien attack
3100-3113 explosion 1
3200-3496 mothership pick up
5000-5104 end mission titles
[illegible] explosion 2
5200-5310 high scoring
7000-7040 explosion 3
7100-7140 red alert sound
10000-10030 introduction sound

Alien Attack is a BASIC program using the Commodore 64's sound and low res graphics to the full.

Fundamentally the game falls into the blast'em and beat'em format with an interesting variety of space scenarios.

There are a potential 31 levels of skill available — all determined by the player using the F1 function key as the game titles are first displayed. Don't be over-ambitious — you may survive the first section but the difficulty level remains with you.

Stages of play are:

1 Introduction titles — note sprite letters

2 Music from the Planets — not Holst, to be sure, but he didn't have to PEEK and POKE every note!

Pressing the space bar appropriately commits you to the game. Attack sirens wail and you exit from hyperspace to withstand a head-on onslaught.

3 Twirling rockets — evade the rocket using a joystick in port 1 or keyboard.
CTRL left
2 right
left arrow down
1 up

4 Refuelling. Having survived the rockets you can attempt to dock at the vintage fuel station to recharge your lithium fuel banks.

Use your steering to manoeuvre, but be aware that doing so could leave you stranded. When you dock with the pump autofill will commence with the

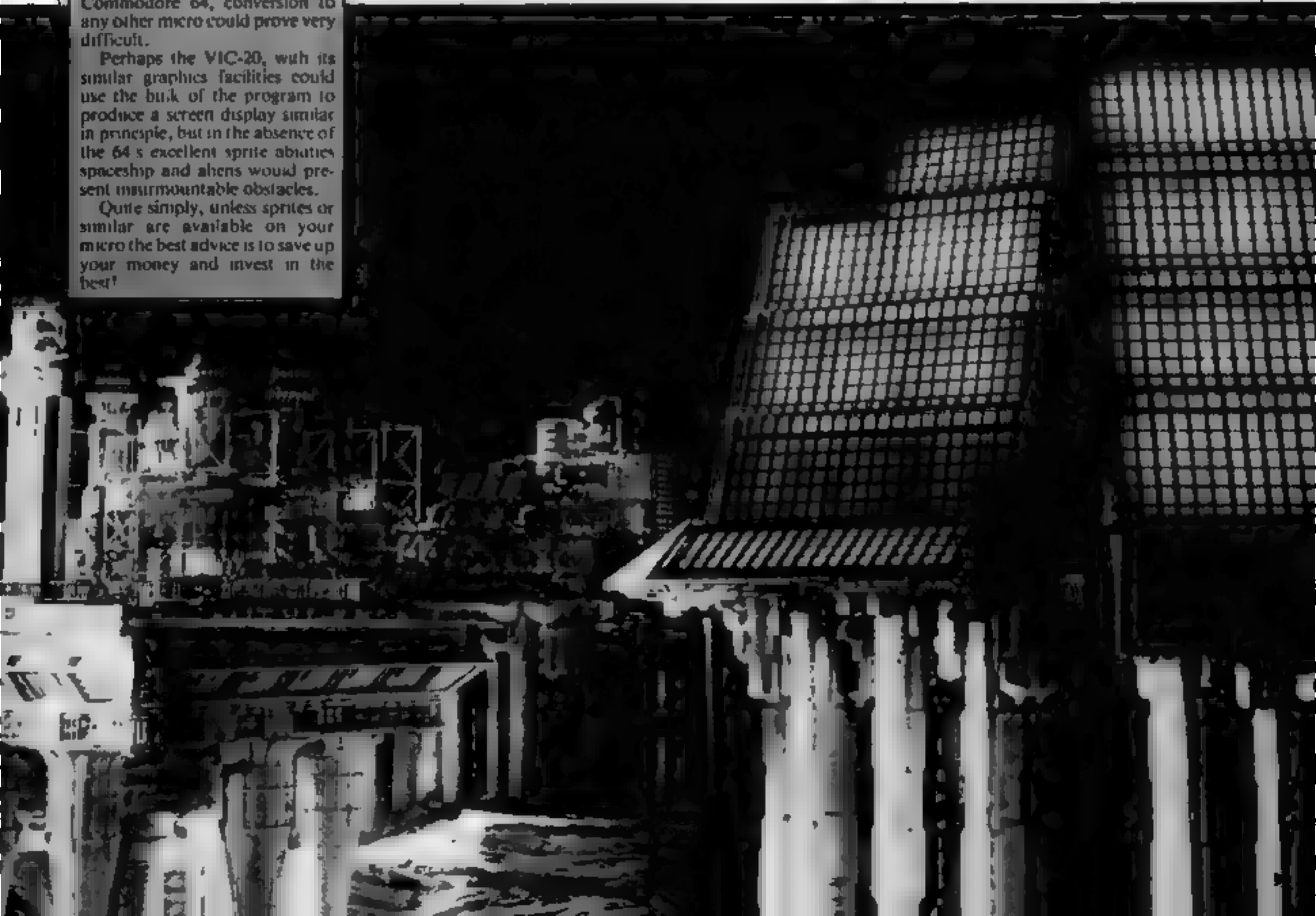
Variables
VO,WA,H,LO,AT,SU voice 1 sound registers
X,X1,X2,X3,Y,Y1,Y2,Y3 sprites' x,y locations
HS,HS high score variables
OP,SO value of high note
WF,WQ values for voice waveforms
D1,MO direction of spaceship's movement
AB$,AC$ variables to print the tractor beam
HI number of hits on the alien's craft
SP number of alien spacecraft destroyed
T amount of fuel spacecraft has left
SC score
FG sprite 1 location pointer
BU tests if laser has been fired
JV value of the joystick (direction)
RS rocket speed and level of play
V VIC chip register

Hints on conversion

Due to the extensive use of sprites and user defined graphics, which are both powerful tools of the Commodore 64, conversion to any other micro could prove very difficult.

Perhaps the VIC-20, with its similar graphics facilities could use the bulk of the program to produce a screen display similar in principle, but in the absence of the 64's excellent sprite abilities spaceship and aliens would present insurmountable obstacles.

Quite simply, unless sprites or similar are available on your micro the best advice is to save up your money and invest in the best!



energy transfer making your ship pulse with trapped radiation.

5 Now that you have fuel you journey to the rendezvous asteriod to pass on the information you have gathered — the aliens have forseen the possibility of you going there and have planted floating mines, one of which is programmed to move up and down towards the surface to restrict access to the only landing site on the whole asteroid.

You can sideslip between the mines or power in from the sides using more fuel. Joystick fire button or keybaord space bar give you a boost facility — be sparing on its use.

Warning: You must land in the centre of the pad to survive the impact.

6 Alien Attack: Typically, just when you think you are safe another phase begins. Alien kamikaze squads plunge down at you — their merest touch will destroy you. Your cannon is in auto-fire and by moving left and right you discover that eight hits on their ships causes them to explode into fragments.

The number of these attackers was set by you when you selected game level at the beginning — you only have yourself to blame if you fail now!

7 At last you succeed — when you landed your home-phone rang your mum and here she comes in her mothership. Down comes the tractor beam. Slip into the beam and away you go.

If you make it or even if you fail along the way there is a possibility that you have achieved the high score. If this is the case another sound experience unfolds. Enter your name for immortality...well at least until bedtime. Happy zapping!

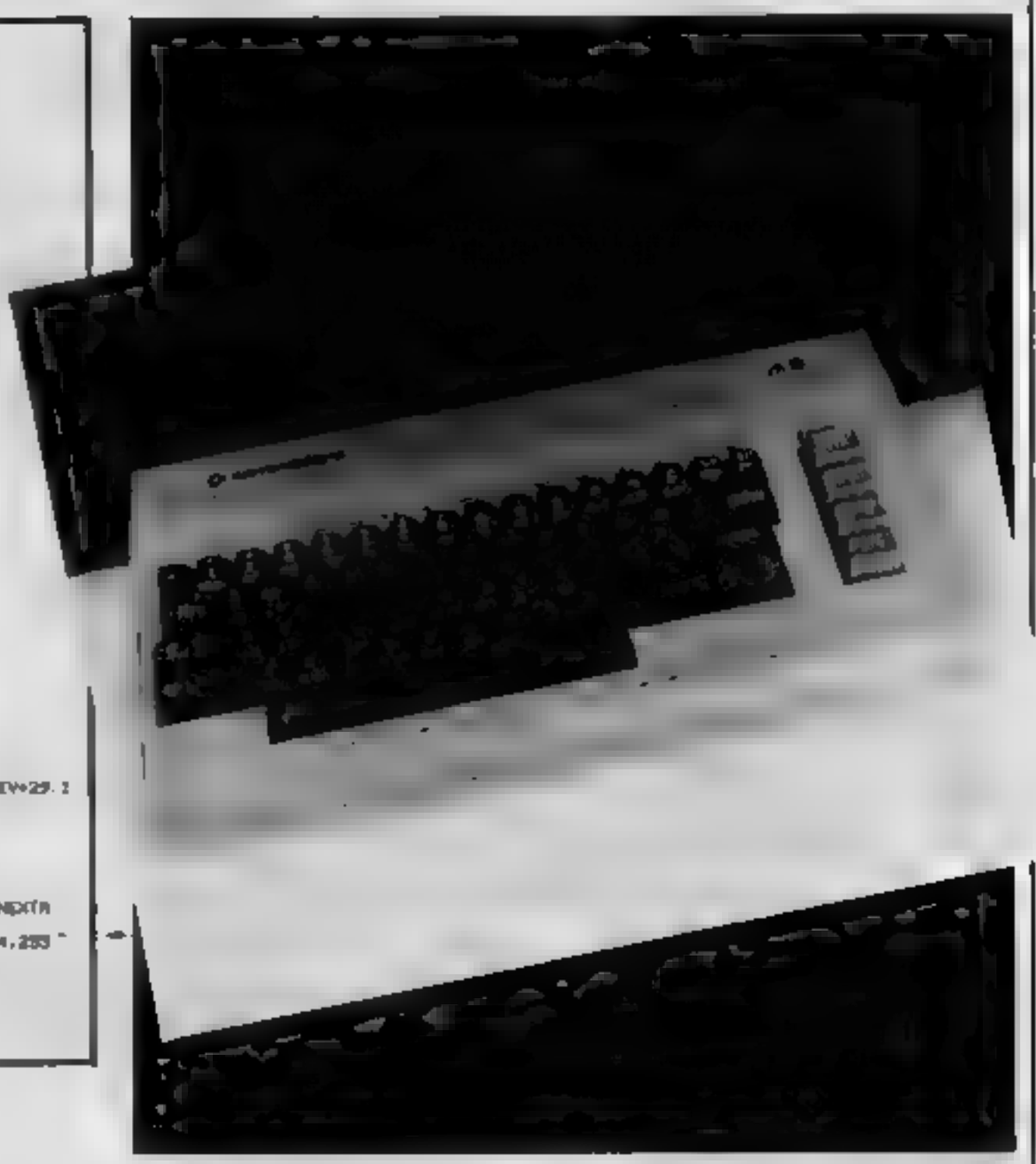
```
1 POKE54296,0 HS=1000 HS$="ALIEN ATTACK..." ME=33 OP=36000 FG=2040 MO=33 VA=5
2 PRINT"" V=53248 POKEV+21,0 POKEV+39,0 POKEV+32,0 P=200 RS=20 T=75 SC=0
4 X=150 Y=50 POKE650,255 CR=0
8 M=54273 VO=M+23 WA=M+3 AT=M+4 LO=M+1 SU=M+5 V1=15 MI=0 GP=0
9 FORM=200TO214 POKEM,0:NEXT READ0$ POKEM+4,0 : NEXT NEXT
10 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,31,0,0,20,0,1,20,0,0,95,160,130,63,254,0
12 DATA139,224,0,20,0,0,20,0,0,31,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
21 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,31,0,4,20,0,72,159,224,34,95,190,4
22 DATA31,224,1,20,0,0,31,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
31 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,133,31,0,,6,63,224,72,159,254,2
32 DATA95,160,0,31,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
41 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,4,0,0,,45,31,224,72,95,254,21,3
42 DATA224,64,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
51 DATA0,0,0,0,56,0,0,124,0,0,254,0,0,238,0,0,7,239,192,15,239,224,31,255,240,61
52 DATA255,192,63,255,252,63,,63,252,127,126,254,254,126,,127,248,119,15,0,119,0
53 DATA0,119,0,1,247,128,3,255,192,1,255,128,0,255,0,0,126,0
61 DATA0,0,64,1,0,0,0,16,0,32,0,0,0,0,0,,28,0,64,0,0,0,0,0,4,32,0,0,0,0,0,0,32,0
62 DATA0,0,0,5,0,0,0,0,0,16,0,0,1,0,0,0,0,128,0,0,0,0,,6,0,0,0,0,0,0,0
71 DATA0,16,0,0,,6,0,0,56,0,0,56,0,0,56,0,0,54,0,16,56,16,,6,,24,16,56,60,56,56
72 DATA124,56,56,56,56,56,254,56,57,255,56,59,255,184,63,255,248,59,255,184,56
73 DATA254,56,16,56,,6,0,0,0,0,0,0,0,0,0
91 DATA0,0,0,0,72,0,0,72,0,4,72,,28,2,253,0,1,222,0,3,255,0,31,129,224,3,255
92 DATA0,31,239,224,3,127,0,1,246,0,2,253,0,4,72,,28,0,72,0,0,72,0,0,0,0,0,0
93 DATA0,0,0,0,0,0,0,0,0
,0, DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,15,255,3,193,254,6,96,252
102 DATA3,255,240,254,,27,224,31,255,240,6,96,252,3,193,254,0,15,255,0,0,0,0,0
103 DATA0,0,0,0,0,0,0,0,0
131 DATA3,255,0,3,255,0,3,255,128,3,255,64,3,255,32,3,255,16,0,252,0,0,252,4,7
132 DATA255,132,7,1,143,7,63,159,7,63,176,7,63,160,7,3,128,7,63,128,7,63,128,7
133 DATA63,128,7,63,128,7,255,,28,,0,255,192,15,255,,92
134 DATA0,,26,0,0,0,0,255,0,0,0,0,,,255,128,0,0,0,3,,29,192,0,0,0,7,0,224,0,0
135 DATA0,15,255,240,0,0,0,31,255,248,0,0,0,56,0,28,0,0,0,112,0,14,0,0,0,224,0
136 DATA7,0,0,0,0,0
137 DATA0,24,0,0,24,0,0,24,0,0,24,0,0,24,0,0,24,0,0,24,0,0,24,0
138 DATA0,24,0,0,24,0,0,24,0,0,24,0,0,24,0,0,24,0,0,24,0,0,24,0
139 DATA0,24,0,0,24,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
140 DATA252,0,0,255,,92,0,255,252,0,255,255,,92,255,255,248,48,195,0,255,255
141 DATA240,255,255,192,255,252,0,255,216,0,254,28,0,252,12,0,96,0,0,96,0,0,112
142 DATA3,248,0,3,248,0,0,12,0,0,12,0,0,0,0,0,0,0,31,0,0,127
143 DATA0,0,63,0,3,255,0,63,255,3,,255,255,15,255,255,0,195,12,15,255,255,3,255
144 DATA255,0,63,255,0,27,255,0,56,63,0,48,63,0,96,6,0,96,6,31,192,14,31,192,0
145 DATA48,0,0,48,0,0,96,0,0,248,0,0,254,0,0
146 DATA0,0,0,0,60,0,0,126,0,0,255,0,0,60,0,0,36,0,0,60,0,0,60,0,0,60,0,0,60,0,0
147 DATA60,0,0,126,0,0,,126,0,0,118,0,0,118,0,0,110,0,1,239,128,3,255,192,,255
148 DATA128,0,255,0,0,126,0
150 X=150:X1=150:Y=0:Y1=255:POKEV,X:POKEV+1,Y:POKEV+2,X1:POKEV+3,Y1:POKEV+21,3
151 PRINT"":T=75
160 POKE0,210:POKE2041,210:POKEV+39,0:POKEV+40,0:POKEV+33,3:POKEV+29,3
170 Y=Y+8.5:Y1=Y1-1:I=
180 POKEV,X:POKEV+1,Y:POKEV+2,X1:POKEV+3,Y1
```

```
190 IFV>65THEN210
200 GOTO170
210 PRINT"[redacted]IDY"
220 PRINT"[redacted]THE 64    "
230 PRINT:PRINT:PRINT
235 PRINT"B    USE ALL YOUR SKILL AND JUDGMENT TO "
236 PRINT:PRINT"B NAVIGATE YOURSELF SUCCESSFULLY THROUGH "
237 PRINT:PRINT"B DEEP SPACE     " :PRINT:GOSUB10000:POKEV,0
240 PRINT"B          ROCKET SPEED " RS
250 GET#8,IFR$="B"THENRS=RS+1
255 IFA$=" "THEN295
260 PRINT"TT"
265 IFRS/50THENRS=20
270 GOTO240
290 REM### TWIRLING ROCKET ###
295 POKEV+23,0:POKEV+32,0:POKE2041,200
300 POKEV+21,0:X=0:X1=255:Y=50:Y1=150:PRINT"":POKEV+23,0:POKEV+29,3
310 POKEV,X:POKEV+1,Y:POKEV+2,X1:POKEV+3,Y1:POKE2040,200
311 PRINT"WORLD ALERT! RED ALERT! ROCKET APPROACHING "
312 POKE53265,PEEK(53265)AND239
314 FORM=0TO999:B=INT(RND(1)*959):POKE1064+B,46:POKE55336+B,1:NEXT
315 FORM=0TO8:B=INT(RND(1)*959):POKE1064+B,0:POKE55336+B,2:NEXT
316 POKE53265,PEEK(53265)OR16
317 GOSUB7100
318 FORM=0TO1000:NEXT
320 POKEV+21,3:POKEV+39,1
321 PRINT"[redacted]ROCKET'S TRAJECTORY AHEAD.USE    CAUTION !!"
329 POKEV0,15:POKE7,88:POKEM,29
330 POKEV+30,0:JV=PEEK(56321):JV=15-(JVAND15)
331 POKEF0+P,P+1:IFP>200THENP=200
340 IFJV=1THENY1=Y1-6
350 IFJV=2THENY1=Y1+6
360 M=M+RS:X1=X1-1:POKEM,32
370 IFV>Y1THENY=Y-3
380 IFY<Y1THENY=Y+2
385 POKEM,129
390 IFY1>230THENY1=230
400 IFY1<53THENY1=53
410 IFX1<140THEN350
420 IFX>250THENX=0:Y=Y1:SC=SC+100
425 POKEM,56:POKE0,67
430 IF PEEK(V+30)AND2=2THEN500
440 POKEV,X:POKEV+1,Y:POKEV+2,X1:POKEV+3,Y1:POKEM,0
450 GOTO30
500 POKEM,0:IFX<50THENX=X1
501 POKE1040,205:POKEV+29,0:POKEV+40,5:POKEV+21,1
510 FORM=14TO85STEP-0.2:POKEV+23,M:POKEV+29,M:POKEV+27,0
511 POKEV0,0:POKEM,129:POKE7,15:POKE56,155:POKEM,28:POKE0,56
512 POKEM,0:POKE7,0:POKE56,0:NEXT
520 POKEV+21,0:PRINT"":FORM=0TO200:NEXT:POKEV+23,2:POKEV+29,2:POKEV+27,1
550 FORM=0TO200:NEXT:POKEV+23,2:POKEV+29,2:POKEV+27,1
560 POKEV+21,3:X=40:Y=0:POKEV,X:POKEV+1,Y:PRINT"":NEXT:POKEV+21,3
569 REM ### REFUELLING ###
570 POKEM,0:PRINT"[redacted]   REFUELLING STATION APPROACHING SHIP
571 POKEV0,5:POKE7,89:POKEM,14:POKE56,155
572 X=X+0.15:X1=X1+0.6
580 IFX1>254THENPOKEV0,0:GOTO600
[redacted]K POKEV+1,Y:POKEV+2,X1:POKEV+3,Y1:POKE7,7:POKE0,89:POKEM,129
599 GOTO572
600 POKEV0,15:POKE7,89:POKEM,33:POKE56,155:POKE7,2
601 POKEV+30,0:JV=PEEK(56321):JV=15-(JVAND15)
604 PRINT"[redacted]                    FUEL "T:IFT<0THEN4999
604 MQ=33
605 IFJV=1THENY=Y-2:T=T-0.5:MQ=129:YA=15
610 IFJV=2THENY=Y+2:T=T-0.5:MQ=129:YA=5
620 IFJV=4THENX=X-2:T=T-0.5:MQ=29:YA=0
630 IFJV=8THENX=X+2:T=T-0.5:MQ=29:YA=0
640 IFX1>250THENX1=250
645 IFX1<69THENX1=69
650 IFY1>230THENY1=230
660 IFY1<53THENY1=53
665 POKEV+2,X1:POKEV+3,Y1
670 IF(PEEK(V+30)AND2)=2THEN690
675 POKE7,YA:POKE0,INT(60*RND):POKEM,MQ
680 GOTO601
690 POKEV0,0:PRINT"[redacted]                    BONUS FOR SPEED ";T*100:FORM=0TO3000:NEXT
699 SC=SC+T*100
700 PRINT"[redacted]   DOCKING O.K REFUELLING IN PROGRESS"
710 FORM=0TO150:POKEV+39,A:POKEV+40,A+1:FORM=0TO50:NEXT:PRINT"[redacted]FUEL "T
711 POKEV0,15:POKEM,33:POKE7,15:POKE56,155:POKEM,A:POKE0,C
712 C=INT(RND(1)*255):POKEM,0:POKE7,0:POKE56,0
714 T=T+3:PRINT"TT":NEXT
720 POKEV+40,2
730 PRINT"[redacted]              ..REFUELLING OVER.
740 X1=X1+1:Y1=Y1-2:X=X+0.5
750 IFY1<30THENPOKEV+21,0:GOTO9000
```

```
760 POKEV,X:POKEV+1,Y:POKEV+2,X1:POKEV+3,Y1
770 GOTO 40
800 V=V+1:A=A+40:FORM=0TO40:PRINT"":NEXT
809 POKE[redacted]:PEEK([redacted]):END
810 FORM=0TO39:B=INT(RND(1)*255):POKE1064+M,B:POKE55336+M,1:NEXT
811 FORM=0TO39:B=INT(RND(1)*255):POKE1064+M,B:POKE55336+M,1:NEXT
820 PRINT"[redacted]
830 [redacted]
840 POKEV+39,255:POKEV+40,2
850 POKEV+1,50:POKEV+21,255:Y3=80
860 POKE2041,206:D=1:POKEV+40,5
865 POKEV,200:POKEV+1,150:POKE,,4,,80:POKEV+5,150:POKE2040,207:POKE2042,207
866 POKEV+6,,50:POKEV+7,80:POKE2043,207
867 POKE[redacted]:PEEK([redacted]):D=10
868 POKEV+5,,5:POKE7,9:POKE56,240
870 POKE,,30,0
871 JV=PEEK(56321):JV=15-(JVAND15)
880 IFJV=4THEN[redacted]:D=-1:POKE,,40,5:T=T-0.5
885 IFJV=8THEN[redacted]:D=2:POKE,,40,5:T=T-0.5
890 IFPEEK(197)=60THENY=Y-[redacted]:POKEV+40,2:T=T-2:ME=129
900 IFD=1THEN[redacted]:POKE,,40,5:T=T-0.5
910 IFD=-1THEN[redacted]:POKEV+40,5:T=T-0.5
920 Y=Y+1:POKEM,ME
921 POKEM,6:POKE0,INT(Y/8):POKE,,56:ME=1
930 POKEV+6,,:POKEV+3,Y1
950 IFA=,,30THEN[redacted]=,5
960 IFX1<15THENX=250
965 IFY<20THENY=100
970 IFY1>2[redacted]:42AND(X1<191THENX=999
975 IFY1>206THENY=100
976 IF(PEEK(V+30)AND2)=2THENY=100
980 POKEV+30,0
981 IFRS=>48THENY2=Y2+0.5:POKEV+7,Y2:IFY2>200THENY2=200
982 IFRS<=48THENY2=Y2+0.2:POKEV+7,Y2:IFY2>200THENY2=200
983 PRINT"[redacted]FUEL "T:IFT<0THEN4999
984 PRINT"TT"
985 GOTO870
999 PRINT"[redacted]
1000 PRINT"[redacted]                    Y=Y1:X=X1:POKEV,
1001 POKEV+21,2:FORM=0TO300:NEXT:PRINT"[redacted]
1010 POKEV+1,Y:POKEV+2,70:POKEV+3,0:POKEV+29,3:POKEV+23,2:POKE650,255:POKEV0,0
1020 POKEV+21,3:POKE,,40,206:Y=204:X1=70:Y1=40:X2=X+10:Y2=Y-10:POKE650,255
1030 POKEV+30,0:JV=PEEK(56321):JV=15-(JVAND15):POKE2041,204
1040 IFJV=4THENX=X-5:X2=X-5:MQ=1:T=T-1
1050 IFJV=8THENX=X+5:X2=X+5:MQ=2:T=T-1
1060 IFMQ=2THENX1=X1-3
1070 IFMQ=1THENX1=X1+3
1080 IFX1>245THENX1=25
1090 IFX1<25THENX1=245
2000 IFX>242THENX=242:X2=232
2001 IFX<25THENX=25:X2=35
2010 Y1=Y1+1:0:IF PEEK(V+30)AND1>=1THEN3100
2015 PR[redacted]CORE " SC:PR[redacted]FUEL " T
2016 PR[redacted]TT:POKE0,15:POKEM,33:POKE56,255:POKE7,15:POKE0,28:POKE0,120
2017 POKEM+7,33:POKE56+7,15:POKE7+7,255:POKE+7,120:POKE0+7,28
2020 POKEV,X:POKEV+1,Y:POKEM,0:POKE7,0:POKE56,0
2021 POKEM+7,0:POKE7+7,0:POKE56+7,0
2030 BU=5:IFT<0THEN4999
2040 IFY1>204THENY1=0
2050 POKEV+2,X1:POKEV+3,Y1:POKE2041,214
2060 IFBU=0THEN1030
2070 POKEV+21,7:POKE2042,211:POKEV+4,X2:POKEV+5,Y2-18:POKEV+29,7:POKEV+23,4
2080 Y2=Y2-32
2090 IFPEEK(V+30)AND2THENBU=0:Y2=Y-10:POKEV+21,3:HI=HI+1:SC=SC+50:POKEV+40,HI
2095 IFHI>27THENGOSUB7000
2096 IFSP>RS/7THENSC=SC+5000:POKEV+21,1:GOTO3200
2098 POKEV+5,Y2:IFY2<50THENY2=230
30 0 BU=5
3020 GOTO1030
3030 Y2=Y-10:BU=0:POKEV+21,3
3040 GOTO1030
3100 POKEV+21,1:FORM=14TO85STEP-0.2:POKE2040,205:POKEV+23,1:POKEV+29,1:POKEV+27,0
3110 POKEV0,0:POKEM,129:POKE7,15:POKE56,155:POKEM,28:POKE0,56:POKEV+40,1
3111 POKEM,0:POKE7,0:POKE56,0
3130 POKEV+29,0:POKEV+7,77:POKEV+17,16:NEXT:POKEV+21,0:PRINT"":GOTO5000
3200 POKEV+21,1:POKE2043,206:POKE2041,213:POKE1064,214:POKEV+23,6:POKEV+29,14
3210 X1=X-52:X2=269:Y1=0:Y2=0:POKEV+40,2:POKEV+41,2:POKEV+42,14:POKEV+21,14
3211 POKEV+6,X:POKEV+7,Y:POKEV+2,X1:POKEV+3,Y1:POKEV+4,X2:POKEV+5,Y2
3220 POKEV0,15:POKE7,56:POKE7+7,33:POKE0,255:POKE56+7,255:POKEM,33
3221 POKEM+7,33:POKE0,2:POKEM+7,2:POKE,,0:POKE,,+7,6
3223 FORM=0TO485STEP0.1:POKEV+3,A:POKEV+5,A:NEXT:POKEV0,0
3225 PRINT"[redacted]
3230 A$="[redacted]"
3232 A$="[redacted]"
3235 PRINT"[redacted]"
3240 POKEV0,15:FORM=5TO23:POKEM,A:POKEM+7,A:PRINTA$:NEXT
3245 GOTO4000
```

COMMODORE 64 PROGRAM

```
3600 FORR=15TO0STEP-2 POKEV+7,R POKEV+5,R POKEV+3,R NEXT
3610 PRINT "J" POKEV+21 0
3611 GOTO5000
3620 GOTO4999
4000 PRINT"■   ENTER THE TRACTION BEAM FULLY   "
4001 [illegible]
4004 IFA$="■"THENX3=X3-1
4005 IFA$= "THENX3=X3+1
4010 IFX3>254THENX3=253
4015 IFX3<25THENX3=25
4020 IFX3=178THENFORR=Y3TO680STEP-0.2 POKEV+7,R NEXTR GOTO4060
4050 POKEV+6,X3 POKEV+7,Y3
4055 GOTO4001
4060 PRINT "■■■"
4061 FORR=0TO18 PRINTAC$ NEXT
4070 POKEV0 15 POKEA7 56 FORR=60TO85STEP-4 J POKEV+2,R POKEV+5,R POKEV+7,R
4080 POKEN 2 POKEN+7,2 POKEWA,20 POKEWA+7 33 NEXT
4096 GOTO5000
4999 PRINT "■       YOUR FUEL SUPPLY RAN OUT!!       " FORR=0TO5000 NEXT
5000 POKEWA+7 0 PRINT"J" POKEV+21 0 IFSC>HSTHENHS=SC GOSUB5100
5010 PRINT"■■■■■■■   ON YOUR MISSION YOU MANAGED TO " PRINT
5020 PRINT" SCORE " SC,",","■THE HIGH SCORE IS " HS PRINT
5040 PRINT"■THE HOLDER OF THE HIGH SCORE IS" PRINT PRINT"          " ;HN$
5050 PRINT PRINT"■     PRESS ■SPACE■ TO PLAY"
5060 GETR$
5065 IFR$<>" "THEN5060
5070 POKE650,0 SC=0 M=0 SP=0 POKEV0 0 POKEWA,0 POKEA7 0 POKEWA+7 0
5080 RESTORE PRINT"[illegible]                    PLEASE WAIT" GOTO9
5100 POKEV+21,2 FORR=1,4TO85 STEP-0.2 POKE2041 205 POKEV+23,2 POKEV+29,2
5101 POKEV+23 0 POKEV+29 0 POKEV+40 1
5102 POKEV0,R POKEWA ,29 PUKEA7 15 POKESU,155 POKEH,20 POKELO,56
5103 POKEWA 0 POKEA1 0 POKESU 0 NEXT
5 04 GOTO5000
5200 PRINT"J" POKEV0,15 POKEA7 32 POKESU,255
5201 POKEA7+7 32 POKEA7+14 32 POKESU+7 255 POKESU+14 255 POKEWA+7 33
5209 POKEWA+14,33 POKEWA,39 FORR=2000TO2600STEP240
5220 POKEH R=INT(R/256)*256 POKEH+7 0 POKEH+14 6
5230 PRINT"■■■■■ HIGH SCORE ■■■■■ HIGH SCORE ■■■■■"
5240 NEXTR POKEV0 0 PRINT"J"
5250 INPUT ENTER NAME FOR HIGH SCORE" HN$
5300 IFLEN HN$)>15THENHN$=LEFT$(HS$ 15)
5310 RETURN
7000 FORR=14TO85STEP-0.2 POKE2041 205 POKEV+23,2 POKEV+29 2 POKEV+23,6 POKEV+29,2
7010 POKEV0,R POKEWA,129 POKEA7 15 POKEH,20 POKELO,56 POKEV+40 1
7020 POKEWA 0 POKEA7 0 POKESU 0 NEXT
7030 POKEV+23 2 POKEV+29 2 Y1=0 POKEV+3,Y1 POKE2041,206 POKEV0 15
7040 HI=0 SP=SP+1 SC=SC+50 RETURN
7100 POKEV0 15 POKEA7 56 POKEA7+7 33 POKESU,255 POKESU+7 255 POKEWA,33
7110 POKEWA+7,33 POKEWA+4 33 POKEA7+14 32 POKESU+14 255
7120 FORR=1TO8 POKE53281 R FORB=0TO40 POKEH 3 POKEH+7 3 POKEH+14,3 NEXTB NEXTR
7140 POKEWA+7 0 POKEWA+14 0 POKEV0 0 POKE53281 0 RETURN
10000 POKEA7 33 POKEA7+7 33 POKEA7+14 33 POKESU,255 POKESU+7,255 POKESU+14,255
10001 POKEV0 15
10010 POKEWA 33 POKEWA+7 33 POKEWA+14 33
10020 FORR=0TO8 B=PEEK(1)AND(7-R) +R POKEH B POKEH+7 B POKEH+14,B POKELO,6
10030 FORC=0TO100 NEXTC NEXTR RETURN
```



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Games off the beaten track

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Danger UXB
BBC B £7.95

Program Power, 8/8a Regent Street, Chapel Allerton, Leeds LS7 4PE

This is a good version of an unusual game which I have seen only rarely in arcades, but which is most enjoyable to play, and uses the BBC sound effects to the full

You are a small nondescript figure in the centre of a grid of blue squares, populated by skulls, bonus flags and ticking time bombs

The object is to defuse these bombs by running over them, while avoiding the lethal skulls Should a bomb blow up before you reach it, a life is lost

Sounds easy? Here's the catch You can only step on a square once, and it disappears, leaving a space which cannot be passed You must use the slide control, which moves an entire row of squares sideways and creates new pathways

The flags can be run over for bunus points, and at the end of each 'phase', you get the chance of more bonus points by dropping your man onto a special flag surrounded by skulls

After this the game speeds up until you have only seconds to defuse bombs. Also available as an option are 'stamping boots' which chase you round the grid, and you can alter the time delay on the bombs

I particularly liked the sound on this game, and the range of optional features, but I suspect that the novelty would eventually wear off after a few long sessions. D.A.

instructions	80%
playability	[illegible]
graphics	70%
value for money	66%

★ ★ ★

Shadowfax
Commodore 64 £7.95

Postern, PO Box 2, Andoversford, Cheltenham, Glos GL54 5SW

The instructions describe Shadowfax as a 'real time adventure' game, but the game controls are more appropriate to an arcade offering

But on loading it turned out to be a sort of mad Donkey Derby You are riding in one direction while about six horses ride towards you

The object of the game is to avoid touching another horse To score points you must zap the enemy horses by firing a thunderbolt at them

You move up and down the screen while the background and enemy horses scroll from left to right. The graphics give a 3-D effect with you moving both under and over the background. The galloping sounds used are very realistic and complement the screen display

Either the joystick or the keyboard can be used to control your movements. The controls are fairly easy to handle and should cause no difficulties

The program does have one fault — it gets boring and repetative quite quickly K.I.

instructions	10%
playability	80%
graphics	95%
value for money	65%

★ ★ ★

Lusitanic
Dragon £4.95

Coppice Software, 7 March Street, Kirton-in-Lindsey, Gainsborough, Lincs DN21 4PH

No instructions at all were provided with my review copy of Lusitanic, but I understand that instructions will be given with retail versions

There are two programs on the tape both of which must be loaded The main program starts with a nicely done graphic representation of an ocean liner

This apparently strikes a rock and the picture changes to show the side of the liner, a desert island and a motor boat. At least I think it is a motor boat but it maybe a floating trampoline

The hopeful survivors leap from the side of the ship and by moving the motor boat you enable them to bounce from it over the water to the island Each man rescued scores a point

If you fail the man lands in the water and after three deaths by drowning the game is over. The highest score and current score are displayed and you are asked if you wish to play again

It sounds simple, and so it would be if only one man jumped at a time, but they are impatient and the number and frequency varies. At one time I had five men trying to reach the island at the same time needless to say they did not all make it

This game probably won't make the best sellers list but I found it amusing using both joystick and keys. J.M.

instructions	10%
playability	70%
graphics	80%
value for money	80%

★ ★ ★ ★

Jungle Fever
48K Spectrum £6.90

A & F, 830 Hyde Road, Manchester M18 7JD

A superb game in which you control a walking, jumping and, if you're not too careful, falling figure through waterfalls, across pits, over spiders etc.

Excellent playability and multi-level structure, in which all is never quite revealed, kept me glued to the keyboard for many hours

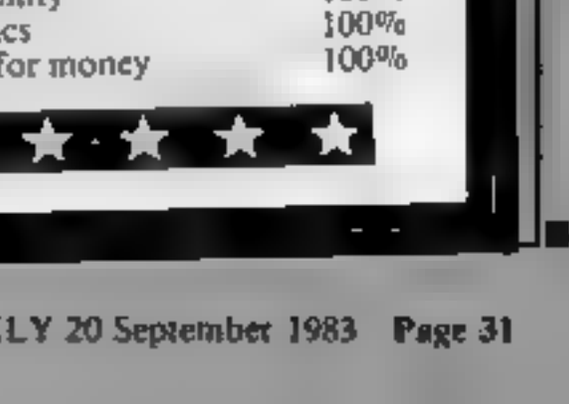
Initially, I thought that swinging across the pit on a rope was totally impossible (and when you've got on the rope — getting off is a whole new ball game), but your intrepid reviewer did it in the end, only to be confronted by those orrible leg gnashing spiders

As you progress up the levels, the hazards combine in new and more terrible ways.

I got to the lethal combination of pygmies, waterfalls, spiders and arrows and was doing quite nicely until an arrow punctured my cranium from behind. Ah well! M.B.

instructions	60%
playability	98%
graphics	98%
value for money	95%

★ ★ ★ ★ ★



Manic Miner
ZX Spectrum £5.95

Bug-Byte, Mulberry House, Canning Place, Liverpool L1 8JB

This game starts with a pleasant view of a house in downtown Surbiton, accompanied by a pleasant rendering of The Skaters' Waltz After a few bars of this merry little tune, the control keys are displayed, and the computer goes into demo mode

You can choose whether you want to watch this or play the game. The demo will show you every cavern your miner has to explore, this time to the accompaniment of another old favourite, Hall of the Mountain King

I'm not sure what Grieg would have thought about one of his works being used as the background to a video game, but you have to hand it to them — it's very clever

Each of the 20 caverns contains danger in many different forms. Platforms you jump on to crumble under your feet, there are poisonous plants, stalactites and various creatures which try to foil your plan of grabbin' the cash

All the things you will meet are very strange and weird. There are robots, penguins, performing seals, Pac-people, mutant telephones, Humpties and toilets (yes, toilets, with seats a flapping) N.B.

instructions	85%
playability	100%
graphics	100%
value for money	100%

★ ★ ★ ★ ★

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Can you dig it?

Grab the diamonds and tunnel for your life in William Bailey's Digger game for the Oric-1

Hints on conversion

PLOT AT in Oric BASIC is equivalent to PRINT AT in most other BASICs.

The Oric uses parallel attributes where most others use serial attributes.

The Oric plots colour at the stated coordinates for the rest of that line unless another PLOT statement is used

The colour codes used in the program are as follows for foreground, 1 red, 2 green, 3 yellow, 4 blue, 5 magenta, 6 cyan, 7 white, 0 black For background 17 red, 18 green, 19 yellow, 20 blue, 21 magenta, 22 cyan, 24 black

The program runs in just over 2K

There's diamonds in them there tunnels — but there's also a hungry monster guarding them.

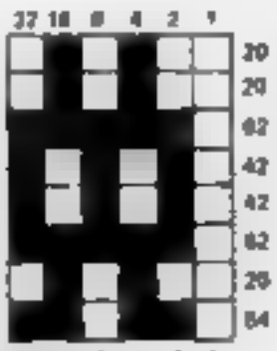
To get the monster to drop the diamonds, you have to tempt him to drop them by making him chase you underground. Being very short sighted, he will inevitably drop a few, and your fuel level goes up each time you can get to the diamonds and pick them up before he does. Pink diamonds score 15 fuel units and red diamonds score 10.

The screen is divided into three areas: yellow, above ground; pink, just below the surface; and red, deep under ground.

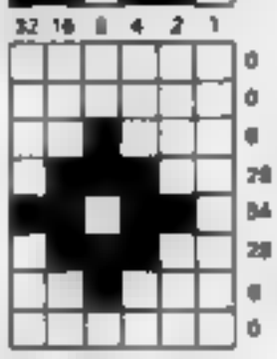
The monster can only dig passages in the pink area because he cannot see well enough in the deeper level. In the red area, he will therefore have to follow the tunnels you dig.

Whenever you tunnel into the ground, you lose two units of fuel, and whenever you are underground but not digging you lose one unit of fuel. If fuel is less than 50 units, you will hear a warning "ping" telling you to refuel or die.

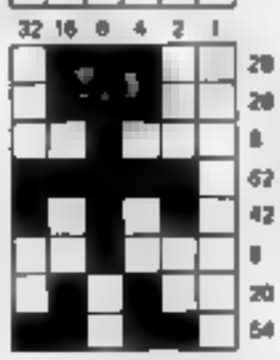
You have five lives, but if fuel reaches zero then the game is over no matter how many lives you have.



THE MONSTER



A DIAMOND



THE MAN

USER DEFINED CHARACTERS

%	1st GROUND LAYER (PINK)
(	2nd GROUND LAYER (RED)
@	MONSTER
#	MAN
&	DIAMOND

TO CHANGE THE USER DEFINED CHARACTERS, ALL YOU NEED DO IS CHANGE THE VALUES IN LINES 1010 — 1030

```
1 S$="":Z$=""
2 INK4:PAPER0
3 LV=5
4 SCO=0
5 SK=0
6 FORF=46592TO46599:READW:POKEF,W:NEXTF
7 FORF=46384TO46391:READW:POKEF,W:NEXTF
8 FORF=46376    TO46383:POKEF,63:NEXTF
9 FORF=46360TO46367:READW:POKEF,W:NEXTF
10 FORF=46344TO46351:POKEF,63:NEXTF
15 CLS:PRINT:PRINT:PRINT:PRINT:PRINT
16 FORF=5TO9
17 PRINT"!xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
xxxxx!"
18 NEXTF
21 FORF=10TO25
22 PRINT"!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!"
23 NEXTF
24 L$="":IFLV=1THEN26
25 FORQ=2TOLV:L$=L$+"# ":NEXTQ
26 PLOT30,0,L$:PLOT29,0,4
30 PING
40 F=200
50 X=4:Y=36
51 MX=4:MY=2
90 PLOTY,X," ":PLOTMY,MX," ":IFRND(1)>.8
5ANDMX>4THENPLOTMY,MX,"&"
91 IFF<100THENPLOT1,0,"                ":WAI
T10:IFF<50THENPING
92 PLOT1,0,"FUEL        ":PLOT6,0,STR$(F)
```

How it works

1-5 sets variables
6-10 defines the characters
16-18 draws four lines of %
20-23 draws 15 lines of !
24-30 prints on the screen number of lives left
48-50 sets remaining variables
90-94 checks fuel, and if necessary warns the player by pinging if fuel is low
95-96 plots the colour on to the screen
97 prints score
98 plots more colours
99-104 monster moves
105-110 you move
120-122 increases score and fuel if you pick up a diamond
123-125 plots diamonds you have picked up on the screen, and if need be clears the screen for new diamonds
126-131 plots the diamonds' colour on to the screen
150 plots you and monster on screen
160 jumps to 500 if you've been eaten
165 jumps to 600 if you run out of fuel
200 loops back to line 90
500 checks to see if you have any lives left. If not, jumps to 550
510-540 deducts one life, emits zap and jumps to line 15
560-610 end routine
1010-1030 data for characters. Remember that the Oric uses an eight by six, not an eight by eight grid to define characters

Note: to show the monster and man more clearly, then add [illegible] to your program

To load, enter [illegible]

ORIC-1 PROGRAM

```
93 IFF>100THENI=2
94 IFF<101THENI=1
95 FORN=10TO24:PLOT0,N,1:NEXTN
96 FORN=5 TO9 :PLOT0,N,5:NEXTN
97 PLOT15,0,"SCORE ":PLOT21,0,STR$(SCO+S
K )
98 PLOT0,0,I :PLOT1,4,19:PLOT38,4,16:PLO
T0,25,2
99 IFINT(RND(1)*2)=1ANDMX<>XTHEN103
100 IFMY<36ANDMY<YANDSCRN(MY+1,MX)<>33TH
ENMY=MY+1:PLAY1,2,1,5
101 IFMY>2ANDMY>YANDSCRN(MY-1,MX)<>33 TH
ENMY=MY-1:PLAY1,2,1,5
102 GOTO106
103 IFMX<36ANDMX<XANDSCRN(MY,MX+1)<>33TH
ENMX=MX+1:PLAY1,2,1,5
104 IFMX>4ANDMX>XANDSCRN(MY,MX-1)<>33THE
NMX=MX-1:PLAY1,2,1,5
106 D$=KEY$:IFD$=>CHR$(8)ANDD$<=CHR$(11)
THENK$=D$
109 IFK$=CHR$(9)ANDSCRN(Y+1,X) >32ANDY<3
6THENF=F-1:PLAY1,2,2,100
110 IFK$=CHR$(10)ANDSCRN(Y,X+1) >32ANDX<
24THENF=F-1:PLAY1,2,2,100
111 IFK$=CHR$(11)ANDSCRN(Y,X-1) >32ANDX>
4THENF=F-1:PLAY1,2,2,100
112 IFK$=CHR$(8)ANDSCRN(Y-1,X) >32ANDY>2
THENF=F-1:PLAY1,2,2,100
114 IFK$=CHR$(10)ANDX<24THENX=X+1
115 IFK$=CHR$(11)ANDX>4 THENX=X-1
116 IFK$=CHR$(8)ANDY>2THENY=Y-1
117 IFK$=CHR$(9)ANDY<36THENY=Y+1
118 IFX>4THENF=F-1
120 IFSCRN(Y,X)=38THENF=F+10:IFX<10THENF
=F+10
121 IFSCRN(Y,X)=38THENS$=S$+"& " :PLAY2,
3,2,500:SCO=SCO+1
122 IFSCO=20THENSK=SK+20:SCO=0:S$=" "
123 PLOT1,1,"
                "
124 PLAY0,0,0,0
125 PLOT1,1 ,S$
126 IFSK=0THENPLOT0,1,4
127 IFSK=20THENPLOT0,1,6
128 IFSK=40THENPLOT0,1,2
129 IFSK=60THENPLOT0,1,3
130 IFSK=80THENPLOT0,1,5
131 IFSK=100THENPLOT0,1,1
140 PLAY0,0,0,0
150 PLOTY,X,"#":PLOTMY,MX,"@"
160 IFMX=XANDMY=YTHEN500
165 IFF<=0THEN600
200 GOTO90
500 IFLV=1THEN550
510 LV=LV-1
520 ZAP
540 GOTO15
```

```
550 PLOT10,5,"**GAME OVER**":PLOT9,5,2
560 EXPLODE
570 PLOT23,5,5
580 GOTO570
600 PLOT10,5,"++OUT OF FUEL++":PLOT9,5,1
602 EXPLODE
605 PLOT24,5,5
610 GOTO610
1010 DATA20,20,62,42,42,62,20,54
1020 DATA0,0,8,28,54,28,8,0
1030 DATA28,28,8,62,42,8,20,54
```

ORIC-1

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Your Dragon's characters and how to invert them

Why does the Dragon go to the trouble of converting ASCII codes into others? David Gray shows how they are used for inverse characters

Like most microcomputers, the Dragon uses a modified version of the ASCII character set to represent characters.

The main differences between the Dragon character set and standard ASCII characters are as follows:

- The ASCII lower case letter codes (97 to 122) are displayed as uppercase letters in inverse video.
- There are no ASCII characters with codes in the range 128 to 255. On the Dragon these codes represent graphics characters.
- Various other ASCII character codes are displayed differently — see table 1.

The following small program will display the characters with codes in the range 32 to 255.

```
10 CLS
20 FOR I = 32 TO 255
30 PRINT  " ";CHR$(I),
40 NEXT I
50 END
```

With the ASCII character set the codes between 0 and 31 represents control characters, i.e. characters which are not displayed but which are designed to have some effect on the device receiving them. For example code 7 is BEL and normally a device receiving this code will emit (bell) sound.

The following program can be used to see the effects (if any) these codes have on the Dragon

```
10 CLS
20 FOR I = 0 TO 31
30 PRINT I;"WO";CHR$(I);"RD"
40 IF INKEY$ = "" THEN 40
50 NEXT I
60 END
```

If a code has no effect then the PRINT statement in line 30 will display the code followed by WORD, i.e. the character between O and R is ignored. Executing this program reveals that only the codes 7 (BS) and 13 (CR) affect the DRAGON.

Back space (BS) causes the computer to move back a position on the screen before printing and thus WORD comes out as WRD. Carriage Return (CR) causes the computer to take a new line

The memory map of the Dragon indicates that character codes for the characters currently displayed on the screen are held in locations 1024 to 1535, i.e. one byte for each position on the screen. However, examining the contents for these locations reveals that the ASCII codes are not used.

The following program places a code in a fixed position using CHR$ and then uses PEEK to inspect the value held in the display memory.

We can also see that they are not in the same order as the normal ASCII characters.

```
10 CLS
20 INPUT  "CODE PLEASE";X
30 IF X<0  OR  X>255  THEN PRINT   PRINT "INVALID CODE."
40 CLS
50 PRINT @518,CHR$(X)    REM PUT CODE IN NEXT TO LAST POSITION ON SCREEN
60 Y = PEEK(1534) : REM LOOK AT CODE STORED IN LAST BUT ONE BYTE OF SCREEN
   MEMORY
70 PRINT @0 "CODE INSERTED = ";X;
80 PRINT @64,"CODE PEEKED = " Y
90 PRINT @128 "PRESS ANY KEY TO CONTINUE ";
100 IF INKEY$ = "" THEN 100 ELSE 10
```

Using this program we can see that the BASIC interpreter is translating ASCII codes into codes acceptable to the hardware driving the screen.

In the case of CR and BS the interpreter does not actually place a value in memory but just uses the information to decide where to put the next character.

Why go to all this trouble?

The answer is simple. Since the normal ASCII characters represented by codes 0 to 31 are not used in the display memory, these extra codes can be used to supply extra characters. Having these extra codes allows inverses of the characters space to ? (codes 32 to 63), which are not normally available in BASIC.

The following program displays all the available non-graphics characters by POKEing values directly into memory.

```
10 CLS
20 P = 1152
30 FOR I = 0 TO 127
40 POKE P,I
50 P = P+1
60 NEXT I
70 END
```

From the output of this program we can see that the codes 0 to 63 represent inverse video characters and codes 64 to 127 represent the normal characters.

We can also see that there is a simple relationship between the code of a non-graphics character and the code of its inverse. Given a normal character with code N then its inverse has code N-64 The following BASIC subroutine uses this relationship to invert a screen image.

```
3000 REM INVERT SCREEN
3010 FOR P = 1024 TO 1535
3020 K = PEEK (P
3030 IF K>63 THEN K = K-64 ELSE K = K+64
3040 POKE P,K
3050 NEXT P
3060 RETURN
```

The following program uses this subroutine to continually invert a screen image

```
10 GOSUB 3000   GOTO 10
```

This subroutine has two significant disadvantages: it is very slow (about eight seconds to invert a screen) and it does not work on graphics characters.

However, using the same principles it is possible to write a machine code subroutine to solve these problems. The following program inserts such a machine code subroutine into memory locations 32745 to 32767.

```
10 CLEAR 200,32744
100 FOR P = 32745 TO 32767
110 READ A$
120 POKE P VAL("&H"+A$)
130 NEXT P
140 END
150 DATA 8E,04,00,A6,84,81,7F,22,
02,8A,40,A7,80,8C,05,FF,
23,F1,39
```

This subroutine can be executed by using EXEC 32745. It takes about a fiftieth of a second to execute and can be placed anywhere in memory if necessary.

The following program demonstrates the use of this subroutine

```
10 CLS
20 REM DISPLAY ALL
CHARACTERS AVAILABLE
TO BASIC.
30 FOR I = 32 TO 255
40 PRINT CHR$(I),
50 NEXT I
60 EXEC 32745 : REM
INVERT SCREEN.
70 FOR I = 1 TO 500 :
NEXT I : REM WAIT.
80 GOTO 60
```

Two other useful machine code subroutines are given in Table 2 and 3. The subroutine given in table 2 will turn all non-graphics characters into their normal forms and the one given in table 3 will turn them into their inverse video forms. Both subroutines may be placed anywhere in memory.

Code	ASCII character	Dragon character	
94	^	↑	
95	_ (underscore)	←	
96	` (grave)	●	Inverse video
123	{	[	
124	|	\	
125	}	]	
126	~	↑	
127	DEL	←	

Table 1 — differences between ASCII and Dragon character sets

```
8E,04,00,A6,84,81,7F,22,
02,8A,40,A7,80,8C,05,FF,
23,F1,39
```

Table 2 — subroutine to turn all non-graphics characters to their normal forms

```
8E,04,00,A6,84,81,7F,22,
02,84,BF,A7,80,8C,05,FF,
23,F1,39
```

Table 3 — subroutine to turn all non-graphics characters to their inverse forms

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Stockmarket
Dragon 32
£5.95

Bamby Software, Leverburgh, Isle of Harris, PA83 3TX

Do you think you could become a millionaire by dealing in shares on the stockmarket? Here's your chance to try it out with Bamby's stockmarket simulation game.

Starting with only £50,000 you buy and sell shares in any of forty four companies — four companies in eleven groups of different markets (from Chemicals to Transport).

Three external influences affect the share prices: government action which may affect the companies in one or more sections of the market; end of year reports, which affect individual companies, and devaluation of the pound, which may affect the lot

Written in BASIC (the response time is nevertheless fast enough), this is a one player, black on green, text only game. It is well laid out, with good instructions, a good choice of options and is well error trapped.

A very good game of its type, although I would personally have preferred less companies and a two (or more) player option. A pencil and paper to keep track of shares/money is useful when playing this game.

The government action routine seems a bit vague and you are not told which areas of the market are affected, although this could be deliberte in order to increase the difficulty of the game. R.E.

instructions	92%
playability	86%
graphics	n/a
value for money	91%

★ ★ ★ ★

3D Noughts and Crosses
Spectrum
£6.95

Quicksilva, 13 Palmerston Road, Southampton, SO1 1LL

This game incorporates defined-depth superfast alpha-beta pruning coupled with an ultra-refined static position evaluator and a ruthless killer heuristic. Or so it says in the 'instructions' section of the game (loaded before the game proper).

This section is actually mainly trumpet-blowing, presumably designed to blind the player with science so that he is convinced he has a good game no matter how much he hates actually playing it

If you understand the opening sentence of this review then the game is probably for you as you presumably have a strong interest in computerised strategic

But if you don't understand it you should just ignore it and all of the self-congratulatory preamble, because the game is actually pretty good.

It is fast, has four levels of difficulty of which even Beginner is quite challenging, and plays in real time, so exerts strong pressure. It is easy to input instructions and error-trapping is good.

N.W.

instructions	75%
playability	
graphics	
value for money	85%

★ ★ ★ ★

Golf Dragon £8

Microdeal, 41 Truro Road, St Austell, Cornwall PL25 5JE

A machine code version of golf for one to four named players.

At the start of the game you can chose the number of holes to be played. The holes are represented graphically and come in three types — easy, tough and very tough. On the harder levels you encounter sand traps and other natural hazards. At all levels, of course, there is the rough.

For each shot on the fairway you pick your club namely wood iron or putter. For the wood and iron you must also pick the number. You must also decide which direction your shot will take, and this is based on a clock face. Once on the green you must choose both direction and distance

You can slice the ball and get into all sorts of trouble. Once in the rough you have the options to play or lift. If you choose to lift the area around the ball becomes clear but you do lose two strokes. At the end of each hole your score for that hole the round and par for the course are displayed.

I have never played real golf and I am not an enthusiast but I thoroughly enjoyed this game. I might even become an addict yet.

J.H.

instructions	85%
playability	85%
graphics	85%
value for money	90%

★ ★ ★ ★ ★

Empire
Dragon 32
£6.95

Shards Software, 10 Park Vale Court, Vine Way, Brentwood, Essex CM14 4UR

It's you versus the evil Dragon Empire — the red menace in a bid to rule the world A must for budding megalomaniacs.

This is a version of that very popular board game called "Risk" It is extremely colourful and uses hi-res displays showing a map of the world and close-ups of the various 'continents'.

A separate sheet included with the cassette explains all manoeuvres clearly giving you the option to allocate armies to territories and to attack All outcomes are judged by the computer and an on-screen "Comment Box" keeps you informed of your progress.

There are eight levels of difficulty but I soon found that for a fairly even game you had to go to level five or six. The highest levels seem to have the odds stacked against you and, as the Empire always starts first, it's difficult to achieve any success

This is a terrific game. I've played it several times and find it visually attractive and highly addictive. The strategies do vary as each time you select your initial territories. The neutral zones, although unable to attack, can be a help or a hindrance according to their random positioning.

M P.

instructions	95%
playability	90%
graphics	90%
value for money	95%

★ ★ ★ ★ ★

Hustler
Commodore
64 £5.99

Bubble Bus, The Computer Room, 87 High Street, Tonbridge, Kent, TN9 1RT

Hustler is a computer version of Pool. It includes three two-player games and three one-player games. The idea is a good one and is implemented well, although it is rather limited by using only six coloured balls and a white one. These shapes look like sprites to me.

You must position a white cross in line with the white ball to point your cue in a direction. Pressing the fire button or the space bar will shoot the white ball in the required direction.

There appears to be a few bugs in the program. Quite often the computer will crash when you try to hit the white ball — this can be very annoying! The only way to get out of this is to reset the computer and re-run the program.

Another time a ball bounced out of the centre pocket and ran along the edge of the pool table and off the screen. There were no problems when loading the program though.

The introduction to the program consists of a title page and option page. Both are accompanied by a tune which Pot Black viewers may recognise. I think the author of the program could have been a musician at one time because the tune is excellent.

Overall I would say that the game could have been very good, if only it contained no gremlins.

K.I.

instructions	35%
playability	70%
graphics	70%
value for money	60%

★ ★ ★

Get at those VIC-20 commands the easy way

It's tricky making the VIC perform some functions . . . unless you type in Allen Webb's programs. There's a choice of two listings, for 8K or 16K RAM expansions

One of the main failings of Commodore is their inability to extend the resident BASIC to allow ease of use of the facilities offered by the new machines.

This explains the appearance of the Simon's Basic cartridge which attempts to convert the 64 into a more user friendly machine.

For VIC owners, a Super Expander fills some of the gaps in the BASIC, but at a price. After nearly two years of using a VIC, I realised that it was time that I rationalised the use of some of the VIC's facilities. This article is the result.

One of the functions given in the routine works only on a VIC with eight or more kilobytes expansion and bearing in mind the lack of RAM in the basic machine, the routine is only available on machines with at least 8K expansion.

All commands are accessed by a single SYS call (SYS 24128 (16K expansion) or SYS 15936 (8K expansion)). The command is defined by two letters followed by any parameters.
For example:

SYS (SA) command, parameter 1, parameter 2

The actual syntax has a little flexibility in that spaces can be included to ease reading.

The parameters can be numeric values, variables or functions. The one limitation is that if you use a variable for the SYS address, then brackets must be used. Here are some examples of acceptable syntax:

```
SYS24128PA,1,1
SYS 24128 PA,X,Y
SYS(24128) PA, RND(1)*10, Y12
SYS(SA) PA, 0,0
```

SYS SA PA,1,1 will give a syntax error.

Specifically, the commands available are:

Colours
SYS (SA) BC, colour.. the border colour
SYS (SA) SC, colour .sets the screen colour

Sound
SYS (SA) VO, volume...sets volume
SYS (SA) TU, voice, frequency...sets tone

Print at
SYS (SA) PA, X, Y.. sets the cursor to the specified coordinates

Line erase
SYS (SA) LE, Y ...erases specified line

Set height of screen
SYS (SA) RO, number of rows...sets up required number of rows

Set top of memory
SYS (SA) H1, address of top of memory.

For example, to set the top of memory to $5000 use SYS (SA) H1, 5*4096

Change location of screen in RAM
SYS (SA) FR, screen number (in the range 1 to 8)

The VIC with more than 8K expansion supports up to eight screens between $1000 and $2000. I discussed how this is done in an earlier article (Home Computing Weekly No 1).

This command will switch to the screen position specified in the parameter. NB a parameter value out of the range 1 to 8 will result in a nasty crash. Before you can access all of the screens you must raise the start of BASIC with

POKE 642,32: SYS 64824

Listings 1 and **2** give the versions for 8K and 16K. **Listing 3** gives a short demo which should clarify the use of some of the commands (don't forget to raise the start of BASIC before running it!)

Listing 1 — enhanced BASIC, 16K version

```
0 REM
1 DATA32,121,0,201,66,208,3,76,131,94,201
2 DATA83,208,3,76,166,94,201,80,208,3,76,206
3 DATA94,201,76,208,3,76,254,94,201,82,208
4 DATA3,76,23,95,201,84,208,3,76,58,95,201
5 DATA86,208,3,76,108,95,201,70,208,3,76,142
6 DATA95,201,72,208,3,76,220,95,96,32,115
7 DATA0,201,67,208,25,32,115,0,32,253,206
8 DATA32,138,205,32,247,215,198,20,173,15
9 DATA144,41,248,5,20,141,15,144,96,76,0,207
10 DATA32,115,0,201,67,208,246,32,115,0,32
11 DATA253,206,32,138,205,32,247,215,198,20
12 DATA165,20,10,10,10,10,133,1,173,15,144
13 DATA41,15,5,1,141,15,144,96,32,115,0,201
14 DATA65,208,206,32,115,0,32,253,206,32,138
15 DATA205,32,247,215,165,20,133,1,32,121
16 DATA0,32,253,206,32,138,205,32,247,215
17 DATA165,20,133,2,166,1,164,2,24,32,240
18 DATA255,96,32,115,0,201,69,208,158,32,115
19 DATA0,32,253,206,32,138,205,32,247,215
20 DATA166,20,32,141,234,96,32,115,0,201,79
21 DATA208,133,32,115,0,32,253,206,32,138
22 DATA205,32,247,215,165,20,10,133,20,173
23 DATA3,144,41,129,5,20,141,3,144,96,32,115
24 DATA0,201,85,240,3,76,163,94,32,115,0,32
25 DATA253,206,32,138,205,32,247,215,165,20
26 DATA133,1,32,121,0,32,253,206,32,138,205
27 DATA32,247,215,165,20,133,2,166,1,165,2
28 DATA157,9,144,96,32,115,0,201,79,240,3
29 DATA76,163,94,32,115,0,32,253,206,32,138
30 DATA205,32,247,215,165,20,201,15,48,2,169
31 DATA15,141,14,144,96,32,115,0,201,82,240
32 DATA3,76,163,94,32,115,0,32,253,206,32
33 DATA138,205,32,247,215,166,20,224,8,48
34 DATA2,162,8,133,1,189,193,95,141,2,144
35 DATA189,202,95,141,5,144,189,211,95,141
36 DATA136,2,96,0,22,150,22,150,22,150,22
37 DATA150,0,192,192,208,208,224,224,240,240
38 DATA0,16,18,20,22,24,26,28,30,32,115,0
39 DATA201,73,240,3,76,163,94,32,115,0,32
40 DATA253,206,32,138,205,32,247,215,165,20
41 DATA133,55,133,51,165,21,133,56,133,52
42 DATA96
43 FORI=24128TO24574
44 READX:POKEI,X
45 NEXT
46 POKE55,57:POKE51,57
47 POKE56,94:POKE52,94
50 REM
60 REM ENHANCED BASIC 16K VERSION A WEBB 1983
70 REM
```

Listing 2 — enhanced BASIC, 8K version

```
0 REM
1 DATA32,121,0,201,66,208,3,76,131,62,201
2 DATA83,208,3,76,166,62,201,80,208,3,76,206
3 DATA62,201,76,208,3,76,254,62,201,82,208
4 DATA3,76,23,63,201,84,208,3,76,58,63,201
5 DATA86,208,3,76,108,63,201,70,208,3,76,142
6 DATA63,201,72,208,3,76,220,63,96,32,115
7 DATA0,201,67,208,25,32,115,0,32,253,206
8 DATA32,138,205,32,247,215,198,20,173,15
9 DATA144,41,248,5,20,141,15,144,96,76,0,207
10 DATA32,115,0,201,67,208,246,32,115,0,32
11 DATA253,206,32,138,205,32,247,215,198,20
12 DATA165,20,10,10,10,10,133,1,173,15,144
13 DATA41,15,5,1,141,15,144,96,32,115,0,201
14 DATA65,208,206,32,115,0,32,253,206,32,138
15 DATA205,32,247,215,165,20,133,1,32,121
16 DATA0,32,253,206,32,138,205,32,247,215
17 DATA165,20,133,2,166,1,164,2,24,32,240
18 DATA255,96,32,115,0,201,69,208,158,32,115
19 DATA0,32,253,206,32,138,205,32,247,215
20 DATA166,20,32,141,234,96,32,115,0,201,79
21 DATA208,133,32,115,0,32,253,206,32,138
22 DATA205,32,247,215,165,20,10,133,20,173
23 DATA3,144,41,129,5,20,141,3,144,96,32,115
24 DATA0,201;85,240,3,76,163,62,32,115,0,32
25 DATA253,206,32,138,205,32,247,215,165,20
26 DATA133,1,32,121,0,32,253,206,32,138,205
27 DATA32,247,215,165,20,133,2,166,1,165,2
28 DATA157,9,144,96,32,115,0,201,79,240,3
29 DATA76,163,62,32,115,0,32,253,206,32,138
30 DATA205,32,247,215,165,20,201,15,48,2,169
31 DATA15,141,14,144,96,32,115,0,201,82,240
32 DATA3,76,163,62,32,115,0,32,253,206,32
33 DATA138,205,32,247,215,166,20,224,0,48
34 DATA2,162,0,133,1,189,193,63,141,2,144
35 DATA189,202,63,141,5,144,189,211,63,141
36 DATA136,2,96,0,22,150,22,150,22,150,22
37 DATA150,0,192,192,208,208,224,224,240,240
38 DATA0,16,18,20,22,24,26,28,30,32,115,0
39 DATA201,73,240,3,76,163,62,32,115,0,32
40 DATA253,206,32,138,205,32,247,215,165,20
41 DATA133,55,133,51,165,21,133,56,133,52
42 DATA96
43 FORI=15936TO16382
44 READX:POKEI,X
45 NEXT
46 POKE56,62:POKE52,62
47 POKE55,64'POKE51,64
50 REM
60 REM ENHANCED BASIC 8K VERSION A WEBB 1983
70 REM
```

Listing 3 — demonstration of enhanced BASIC

```
0 REM
10 REM
20 REM ENHANCED BASIC DEMO
30 REM
40 SA=24128
50 FORI=1TO8
60 SYS(SA)FR,I
70 PRINTCHR$(147)
80 FORJ=1TO100
90 SYS(SA)PA,RND(1)*20,RND(1)*20:PRINT"*"
100 NEXT J
110 NEXT I
120 SYS(SA)VO,15
130 FORI=1TO8
140 SYS(SA)SC,RND(1)*15+1
150 SYS(SA)BC,RND(1)*8+1
160 SYS(SA)TU,1,RND(1)*50+200
170 SYS(SA)FR,I
180 SYS(SA)RD,RND(1)*10+10
190 NEXT I
200 GOTO 130
```

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How the Space Shuttle launched a software shop

Regular readers will have caught our reviews of Sumlock's programs for the VIC. Here Dave Carlos finds out the story behind the software — and Sumlock's move into new programming pastures

Not many companies involved in microcomputer software can claim to owe their existence to the Space Shuttle. It did however have a part to play in the formation of Sumlock Microware.

"Sumlock was originally involved in office machinery and owned by the American giant Rockwell, but when Rockwell decided to concentrate on major products like the Shuttle contracts, Sumlock was sold to their employees on a franchise basis," said Alan Lee, Sumlock's marketing director.

"From an interest in calculating machines and programmable calculators, we went on to get a dealership for the Commodore Pet, the first affordable microcomputer. We were one of the first in Manchester, and mainly sold business packages and educational software, but eventually the hobby side of the Pet started to grow.

"This meant there was some conflict: we might have a customer trying a complete financial package in one corner whilst another played Space Invaders. It couldn't go on, so we decided to change to the home and hobby side in 1981 with the launch of the VIC 20."

Since then the company has never looked back. It still services business machines in its well-equipped workshop — which also means good service facilities for hobby customers. But now the future of the company is firmly in software production and retailing.

"We sell several VIC programs written by freelance programmers, but now have a team of in-house programmers and are looking to the formation of a separate company for our software," Alan revealed. The programmers in question are Dave Aron and Steve Course, who have been programming for the company for some 18 months now but only recently became full time staff

Dave and Steve delayed going to University to join the company, a decision neither seems to regret. "We have so many ideas, and the new Commodore 64 is such an exciting machine, we expect to be busy for a long time", Dave said.

"We originally programmed on the VIC and with only 3.5K of RAM to play with it was always a problem deciding which features to leave out of a program. But on the 64, we can put in what we like and still have room to spare!"

"Up to now we have concentration on arcade games — that seems to be what most people want at the moment. But we will soon be writing original arcade-quality games using our own ideas. Then we will expand from the Commodore range on to other popular makes," said Steve.

From an attempt at writing a Pacman and a Frogger game in Basic the team, known on their cassettes as 'LiveWire', has come a long way. "We asked them to learn Machine Code and they never flinched," says Alan. "Within a very short space of time they had finished 'Jumpin Jack' for the VIC and the LiveWire series was started."

"One advantage of having the shop is the ability to do market research without too much difficulty. I can't resist talking to our customers and trying to find out what they want from the games. This means we can try to match the product to the customers we know.

"We do feel however that customers should have the chance to see the games before they buy, and the rise in the level of dealer sales makes this more possible."

"An aspect of this business which really worries us is the software piracy. We recently heard of a local schoolboy who was copying games by the gross and selling them through adverts on the school notice board. This is plain criminal and eventually the industry must do something about it or will be in dire straits.

"Another incident which brought this home to us was when a boy came in to buy one micro and sell another because he had over £150 worth of software for the one he wanted, all of which he got 'from his friend'!"

It is little wonder then that the company is considering the production of future releases on ROMs but "One thing is certain," said Alan, "if we got enough evidence against anyone for copying software, we would have no hesitation in taking them to court and hoping for some stiff penalties."

Returning to Sumlock's software range, Alan admitted some uncertainty about the future of the VIC. "If Commodore keeps the price of the 64 at the present level, then there may still be a future for the VIC at the bottom of the price range. We have three new releases in the pipeline for the VIC 20, adding to our current range of fourteen, but now we are concentrating on the 64," said [redacted].

"We are just waiting for the artwork for our first Commodore 64 titles which will be Gridtrap and Jumpin Jack. We expect them to be much superior to anything seen before. They will have 'Halls of Fame', self play, numerous skill levels, one or two player options and include several unique program features. In fact we have tried to incorporate all the features of our present range and add to them from the customer's and reviewer's comments on our past games."

Dave said that time was the main enemy. "We have ideas overflowing but the time to program them all is hard to find. One area we do wish to branch into soon is that of speech synthesis. The Commodore 64 is ideal for this as you can set any note up any way you wish and therefore no hardware expansion is needed."

"It is time we realised that the difference between Arcade Games and micros is that you don't have to put money in them and therefore the games on a micro can be that much more complex and involving," said Steve. "We have some ideas for graphic adventures to exploit this but they will be unlike anything seen yet!"

Overall the company has a great deal of experience in the microfield and doesn't see itself falling behind in any way. "Ideas change so quickly in this business", admitted Alan. "Three months of changes in hardware can change all your plans, but one thing is certain — we expect LiveWire to electrify our future."

Alan Lee: concentrating on the hobby market

Send your letter to Letters, Home Computing Weekly, 145 Charing Cross Road, London WC2H 0EE. Don't forget to name your computer — the best letter could win £5-worth of software. Queries cannot be answered on this page

Where's the software?

I have read many letters for and against the TI 99/4A on your letters page Let me tell you my story

I bought my TI 99/4A a few weeks ago and it cost me £149 95 Not bad, I thought, until three days later in the same shop it went down to £99 95 I put it down to bad luck and thought I must have been too hasty but my problems were only just starting

I can find no good software except games which I like but are all mail order Where is the software for the more serious like myself? But without any doubt the biggest problem is books In the whole of Manchester — and that includes some very big bookshops — I found only one small paperback priced at £10 I did not bother But the biggest problem in the shops was how to avoid being crushed by the yards high, feet deep, piles and piles of Spectrum and Dragon software books! Very annoying

K. J. Bates
Sutton Estate, Salford

Why should we wait?

I hope that this letter gets published and that your advertisers read it and take note of the problems facing soldiers serving overseas

I am the proud owner of a Commodore 64 and, like all of my comrades who own various types of computers, I rely on the postal services of magazine advertisements

I have yet to receive an item of equipment within a satisfactory period of time, i.e. 14 days or even 28 days And asking around I find that my comrades are experiencing the same problem Although our cheques are being cashed promptly, we have to sit back and wait, and wait, and wait

Would firms please note that we are not the minority over here. In fact, as far as ratio is concerned, 27 per cent of my soldiers and friends own some sort of computer but cannot just go to the shops and buy what we like

Firms should also deduct VAT from overseas orders and claim it back through the relevant channels

So come on you distributors — pull your socks up and I am sure that your sales will go up at the same time

Staff Sergeant J. Gadd
BFPO 112

Oric problems (continued)

May I take this opportunity for thanking you for publishing my letter in HCW25. I have had a number of letters from readers, some of whom have outstanding grievances with Oric and all of whom were dissatisfied with the service they have received

I am happy to say that Oric has also contacted me through its public relations consultants who seem keen to deal with any problems. If any other readers are having problems with Oric, I will be pleased to hear from them and pass them problems on

Perhaps Oric will be a little more sensitive to their customers if its responses have to be made in a more public gaze. It is sad that Oric will respond to a letter in the press in less than a week while it is so slow in responding to individual enquiries

Keith Olett, Hookstead,
Goldsmith Ave,
Crowborough,
East Sussex TN6 1RG

Popular Puncman

Thank you for the not-so-unfavourable review in HCW25, but I feel I must write and clarify a few points

Puncman is one of our best selling programs, mainly to educational establishments, and was written by a qualified teacher using principles in popular use in the teaching of punctuation in many schools

Although some schools vary in their approach to this subject, nearly always you will find that the "incorrect punctuation" to which you refer is merely a means of simplifying punctuation to remove the clutter of symbols which a pupil finds himself facing. This gentle introduction to simple punctuation is naturally followed later by more specified tuition in the use of apostrophes, quotes etc. (This is, in fact, following in Puncman 3&4).

The insert tells the user precisely what the program is intended for and which symbols are to be concentrated upon

The "dreadful slang" is a matter of opinion, but I would again point out that this is written by a qualified teacher in a way which in his experience, will best demonstrate the use and at the same time hold the child's attention

May I respectfully suggest that you should co-opt members of the teaching profession when testing educational software (if you do not do so) but that if you intend making specific criticisms of the educational content, rather than the material content, you should for the more serious educational programs, involve a teacher with experience relevant to the subject matter of the software

M. E. Kerslake
Chalksoft, Worcester

Educational software in HCW is reviewed by teachers with experience of the appropriate age/study group.

Spectrum take over

I am writing to complain about the way that Spectrum advertisements, features and other articles have come close to taking over the pages of many computing magazines.

The advertisements very often take over a whole page of a magazine and this can be very annoying to other computer users such as me who has paid good money for the magazine. As a TI-99/4A user, yours is the only magazine which I regularly buy because it is the only one which has taken a serious interest in my computer although even yours has become perhaps a little too "Spectrummy"

Paul Leathley
Fallowfield, Manchester

Making money

I am writing to you concerning the VIC 20 game WACKY WAITERS I have scored £62.23 on it. I would like to know if anyone has bettered this On my first go I got 61p

Anthony Vowles
Knowle, Bristol

Top Ten programs for the Spectrum

1	Tranz Am	Ultimate (–)
2	The Hobbit	Melbourne House (8)
3	Jet Pac	Ultimate (1)
4	Scrabble	Psion (2)
5	Flight Simulation	Psion (3)
6	Horace Goes Skiing	Psion/M. House (6)
7	3D Tanx	dk'tronics (–)
8	Horace and the Spiders	Psion/M. House (4)
9	Ah Diddums	Imagine (9)
10	Test Match	Computer Rentals (–)

Compiled by W. H. Smith. Figures in brackets are last week's positions

Top Ten programs for the Dragon

1	The King	Microdeal (1)
2	Frogger	Microdeal (2)
3	Android Attack	Microdeal (3)
4	Nightflight	Salamander (6)
5	Shuttle	Microdeal (5)
6	Space War	Microdeal (4)
7	Morocco Grand Prix	Microdeal (–)
8	Ring of Darkness	Wintersoft (10)
9	Katerpillar Attack	Microdeal (–)
10	Planet Invasion	Microdeal (7)

Compiled by Boots. Figures in brackets are last week's positions

Top Ten programs for the ZX81

1	Chess	Sinclair (8)
2	Space Raiders	Sinclair (1)
3	Espionage Island	Sinclair (2)
4	Flight Simulation	Sinclair (3)
5	Fantasy Games	Sinclair (4)
6	Football Manager	Addictive (6)
7	Defender	Quicksilva (5)
8	1K Games	Sinclair (4)
9	Asteroids	Quicksilva (–)
10	Invaders	Quicksilva (–)

Compiled by Boots. Figures in brackets are last week's positions

Top Ten programs for the VIC 20

1	Arcadia	Imagine (1)
2	Skyhawk	Quicksilva (2)
3	Wacky Waiters	Imagine (4)
4	Cosmic Crunch (cart.)	Commodore (3)
5	Gridrunner	Llamasoft (6)
6	Panic	Bug Byte (8)
7	Sargon II Chess (cart.)	Commodore (9)
8	Cosmiads	Bug Byte (7)
9	Catcha Snatcha	Imagine (5)
10	Frantic	Imagine (10)

Compiled by Boots. Figures in brackets are last week's positions

U.S. SCENE

Just $25 for all this

The announcement of a rather clever program for the VIC-20 caught my eye this week. I think it deserves prominent mention.

It is called Research Assistant and will run on any VIC-20 having a minimum of 8K RAM a compatible disc drive, and a printer. In fact, the program will also run on the Commodore 64, although for some reason is not being advertised that way

The package consists of three programs, and comes on cassette, although it is readily transferable to disc and will support disc files and tape files interchangeably.

The first of the three programs is called RA Build This is the data entry program which allows you to develop note files on tape or disc The program is menu driven.

When it comes up, the first menu asks if you are going to start a new file, update or add to an existing file, change input/output devices, or quit If you choose to enter data, another menu asks if you are planning to enter a source, a reference, or add to the end of a file

Once source entry has been selected, you can then put it in whatever format you like (such as author, title, comments, etc) Once entered, the information can be edited, saved as is, or erased After a source is on file, you can enter additional references within it and the machine will automatically number these and append them

Each reference can contain the page number and up to 1,020 characters for use as comments After the comment section, you are allowed to enter up to 12 keywords which the program will then use for indexing You can then enter two dates to act as a range for each source reference As entries are made, the program loads them onto either tape or disc as you have indicated

The second program is called RA XRef.Build. This is the cross reference building program. This allows you to construct a cross-reference table for one or more files built by the previous program

Within the allowances of memory, and provided you have not used the same number for several different sources, you can merge the files. As you build the cross reference, the program allows you to use up to 20 date ranges and associated keywords for indexing Using a VIC-20 with 8K RAM, the program will have room for about 112 "slots" (roughly 1,100 bytes) for the cross reference file Each of the slots can hold one keyword and as many as five references to it

As the files are read, and the cross references are created, the system puts the identification numbers on the screen as it works. When done, the system returns to the main menu, and the screen also displays how much memory is left

The final program is called RA Print This section of the system is able to print the cross reference or the source files in any order and interchangeably from tape or disc The printout is formatted as follows the source files are printed with the bibliographic reference first followed by the comments, in turn followed by the keywords and key date ranges;

The reviewer whose evaluation I read used this program on research notes that he had accumulated over 20 years. He found that the system did all it was advertised to do, and indicated that it would be virtually impossible to hand compile the sort of cross reference list that Research Assistant can do so well and so quickly

He also felt that any experienced historian, genealogist, or journalist or other person practiced in research, would find that the note-taking sysem conforms to standard procedure, as taught in school or elsewhere.

The system is very good at error trapping, and is extremely user friendly. It can handle odd reference systems, weird page numbering systems, or even free-form entries having no author citations. Leaving certain data entries blank causes no problems.

Common errors and their fixes are included at the back of the documentation, which is written in clear non-technical English.

If you are doing any sort of research, this program will fill an important gap Best of all, the price is certainly right It costs all of $25 Write for details to TOTL Software, P O. Box 4742, Walnut Creek CA 94596, (415) 943-7877.

That's all for this week. See you next time

Bud Izen **Fairfield, California**

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[illegible] overwhelming sense of acut[illegible] ment. [illegible] a Mysterious Adventure, a[illegible]
Experts believe that TIS [illegible] contracted as a result of prol[illegible] exposur[illegible] Mysterious Adven[illegible]
[illegible] caused by [illegible] any of the following Home Comput[illegible]

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[illegible] heard about this ep[illegible] representatives of DIG[illegible] FANTASIA, a company who are actively involved in [illegible] and development work [illegible] Adventures and [illegible] there is probably no cure for TIS other than mains [illegible] chips etc. which can be [illegible] a Temporary solution". "In the absence of a more permanent [illegible] wise TIS sufferers to submit to the Syndrome and obtain Mysterious Adventures from any sources [illegible] to them". "TIS is highly contagious and [illegible] of the current Worldwide Epidem[illegible] would say enjoy it while [illegible] an, resistance is futile".

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Multi-coloured flashing

Want to make your Commodore 64's screen look flash? Mike Roberts tells you how to go about it

Like the look of those flashing characters you've seen on Prestel and Ceefax displays? Using my program, you can get the same flashy effect on your Commodore 64.

The program uses multi-coloured text mode. This is a more complex mode than the other three text modes because the whole character set needs to be redefined to make good use of the facilities that the mode offers.

The advantages of this mode, however, outweigh the disadvantages for certain applications. Each dot in the character matrix can be one of four colours. background, foreground, and two others defined elsewhere.

These two other colours have their definitions in two of the 6569 VIC chip's registers, and if these registers are changed then the effect is felt all over the screen, and any character using them will have its colour changed.

So if a character set, or in this case half a character set is defined using one of these special colours, its colour can be changed all over the screen by simply changing one register. For a list of the registers used and their locations, see Table 1.

That is the principle behind this program. half of the character set, the reverse field half, is defined using the special colours, one for the foreground colour and one for the background colour. The other half is as normal, except that the characters are only four dots wide — a bit confusing at first, but they are all fairly recognisable.

The method used to change the registers at regular intervals is to redirect the interrupt routine, that is, the one that updates the clock and checks the stop key etc. This is executed every 1/60ths of a second, so it is ideal for our purposes.

The instruction to turn on the flash routine is SYS 49152 and the instruction to turn it off is SYS 49165.

There are four modes of operation of the flashing controlled by poking the flash control register. This is at location 822, so POKE 822,1 gives you mode 1.

The modes are, mode 0: no flashing of foreground or background; mode 1: flashing background only; mode 2. flashing foreground only; mode 3: flashing background and foreground.

How it works

10-90 Introduction
100-1400 character data
1410-1420 check data in DOC
1430 POKE in data for

The speed of flashing is controlled by the speed register at location 823, in 1/60ths of a second, so POKE 823, 60 would make a character flash once every second.

The colours that alternate for the foreground are in locations 821 and 53283, with location 53283 being the current foreground colour and 821 the next foreground colour, so POKE 821,1 and POKE 53283,0 would make the foreground flash between black and white

The alternating colours for the background are stored in locations 820 and 53282, with 820 being the next background colour and 53282 being the current background colour, so POKE 820,2 and POKE 53282,3 would make the background alternate between red and cyan.

Unfortunately only eight colours can be used in multi-colour mode and for this application, they must have values of eight to 15.

So to get black text, use the Commodore key in conjunction with key 1. Using values less than eight for printing the characters will result in garbage on the screen instead of flashing characters.

So to print flashing text the colour POKEs must be set up as above and the system enabled. The character printing colour must be greater than eight, although only the lower eight colours are displayed, and the text must be printed in reverse field

Of course normal procedure can be carried out for non-flashing characters, except that reverse field cannot be accessed.

To get back to normal mode use POKE 53272,21:POKE 53270,200 and to get back to flashing mode use POKE 53272,19:POKE 53270,216.

Note: Before typing in, or loading this program, the instructions

POKE . 44,24:POKE 6144,0:NEW must be executed to reserve memory space for the new character set. This will destroy any program currently in memory.

Table 1 — the registers

Register name	Location	What it does
Background colour 1	820	Next background colour to be used
Background colour 2	53282	Current background colour of flashing character
Foreground colour 1	[illegible]	Next foreground colour
Foreground colour 2	53283	Current foreground colour
Control register	[illegible]	Determines mode of flashing operation
Time register	823	Determines delay between flashes
VIC mode register 1	53270	Enables multi-coloured mode
VIC mode register 2	53272	Relocates character generator (and screen)

Enable flash SYS 49152
Disable flash SYS 49165

```
100 REM DATA FOLLOWS FOR FLASHING CHARACTER SET
110 DATA 60, 51, 51, 51, 48, 48, 60, 0, 12, 60, 51, 60, 51, 51, 61, 0, 60, 61
120 DATA 51, 60, 51, 51, 60, 0, 15, 48, 48, 48, 48, 48, 15, 0, 60, 51, 51, 51
130 DATA 51, 51, 60, 0, 60, 48, 48, 60, 48, 48, 60, 0, 60, 48, 48, 60, 48, 48
140 DATA 48, 0, 60, 51, 51, 48, 51, 51, 51, 60, 0, 51, 51, 51, 60, 51, 61, 51, 0
150 DATA 60, 12, 12, 12, 12, 12, 60, 0, 60, 12, 12, 12, 12, 60, 60, 0, 51, 51
160 DATA 48, 60, 51, 51, 51, 0, 48, 48, 48, 48, 48, 60, 0, 51, 51, 60, 60, 60
170 DATA 51, 51, 51, 0, 51, 51, 51, 60, 60, 60, 51, 0, 12, 51, 51, 61, 51, 61
180 DATA 12, 0, 48, 51, 51, 48, 48, 48, 48, 0, 60, 60, 51, 51, 60, 60, 3, 0
190 DATA 60, 51, 51, 60, 60, 51, 51, 0, 12, 51, 48, 12, 3, 51, 12, 0, 60, 12
200 DATA 12, 12, 12, 12, 12, 0, 51, 51, 51, 51, 51, 60, 12, 0, 51, 51, 51, 51
210 DATA 51, 12, 12, 0, 195, 195, 195, 195, 195, 255, 255, 195, 0, 51, 51, 60, 12
220 DATA 60, 51, 51, 0, 51, 51, 60, 60, 12, 12, 12, 12, 3, 12, 12, 12, 48
230 DATA 60, 0, 48, 48, 48, 48, 48, 48, 48, 0, 12, 51, 48, 60, 48, 51, 60, 0
240 DATA 60, 12, 12, 12, 12, 12, 60, 0, 0, 12, 60, 60, 12, 12, 12, 12, 0, 12
250 DATA 48, 255, 255, 48, 12, 0, 0, 0, 0, 0, 0, 0, 0, 0, 12, 12, 12, 12, 0, 0
260 DATA 12, 0, 51, 51, 51, 0, 0, 0, 0, 0, 51, 51, 255, 51, 255, 51, 51, 0, 12
270 DATA 60, 192, 60, 3, 252, 12, 0, 51, 51, 3, 12, 48, 51, 51, 0, 60, 195, 60
280 DATA 60, 240, 204, 51, 0, 3, 12, 48, 0, 0, 0, 0, 0, 15, 60, 48, 48, 48, 60
290 DATA 15, 0, 60, 15, 3, 3, 3, 15, 60, 0, 0, 195, 60, 255, 60, 195, 0, 0, 0
300 DATA 12, 12, 60, 60, 12, 12, 0, 0, 0, 0, 0, 0, 12, 12, 48, 0, 0, 0, 60, 60
310 DATA 0, 0, 0, 0, 0, 0, 0, 12, 12, 0, 0, 3, 12, 12, 48, 48, 192, 0, 60
320 DATA 60, 51, 51, 51, 60, 60, 0, 12, 60, 12, 12, 12, 12, 60, 0, 60, 51, 3
330 DATA 12, 48, 51, 60, 0, 12, 51, 3, 12, 3, 51, 12, 0, 3, 15, 51, 51, 60, 3
340 DATA 3, 0, 60, 48, 60, 3, 3, 51, 12, 0, 15, 48, 48, 60, 51, 51, 12, 0, 60
350 DATA 3, 3, 15, 12, 12, 12, 0, 60, 51, 51, 60, 51, 51, 60, 0, 60, 51, 51
360 DATA 60, 3, 51, 60, 0, 0, 0, 12, 12, 0, 12, 12, 0, 0, 0, 12, 0, 12, 12
370 DATA 48, 3, 12, 48, 48, 48, 12, 3, 0, 0, 0, 0, 60, 60, 0, 60, 60, 0, 48, 12
380 DATA 3, 3, 3, 12, 48, 0, 12, 51, 3, 12, 12, 0, 12, 0, 0, 0, 0, 255, 255, 0
390 DATA 0, 0, 12, 12, 60, 60, 60, 12, 60, 0, 12, 12, 12, 12, 12, 12, 12, 12
400 DATA 0, 0, 0, 255, 255, 0, 0, 0, 0, 0, 255, 255, 0, 0, 0, 0, 0, 255, 255
410 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 255, 255, 0, 0, 48, 48, 48, 48, 48, 48, 48
420 DATA 48, 12, 12, 12, 12, 12, 12, 12, 12, 0, 0, 0, 240, 252, 60, 12, 12, 48
430 DATA 48, 60, 60, 15, 0, 0, 0, 12, 12, 60, 60, 240, 240, 0, 0, 192, 192
440 DATA 192, 192, 192, 192, 255, 255, 192, 192, 240, 48, 60, 12, 15, 3, 3, 3
450 DATA 15, 12, 60, 48, 240, 192, 255, 255, 192, 192, 192, 192, 192, 192, 255
460 DATA 255, 3, 3, 3, 3, 3, 3, 0, 60, 255, 255, 255, 255, 60, 0, 0, 0, 0, 0
470 DATA 0, 255, 255, 0, 51, 60, 60, 60, 60, 12, 12, 0, 48, 48, 48, 48, 48, 48
480 DATA 48, 48, 0, 0, 0, 15, 60, 60, 48, 48, 195, 195, 255, 60, 60, 255, 195
490 DATA 195, 0, 60, 255, 195, 195, 255, 60, 0, 12, 12, 51, 51, 12, 12, 60, 0
500 DATA 12, 12, 12, 12, 12, 12, 12, 12, 12, 12, 60, 60, 60, 12, 12, 0, 48, 48
510 DATA 48, 255, 255, 48, 48, 48, 192, 192, 48, 48, 192, 192, 48, 48, 48, 48
520 DATA 48, 48, 48, 48, 48, 48, 0, 0, 60, 60, 51, 51, 51, 0, 255, 255, 60, 60
530 DATA 15, 15, 3, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 15, 15, 15, 15
540 DATA 240, 240, 0, 0, 0, 0, 0, 0, 255, 255, 255, 255, 255, 0, 0, 0, 0, 0, 0, 0
550 DATA 0, 0, 0, 0, 0, 0, 255, 192, 192, 192, 192, 192, 192, 192, 192, 204
560 DATA 204, 51, 51, 204, 204, 51, 51, 3, 3, 3, 3, 3, 3, 3, 0, 0, 0, 0
570 DATA 204, 204, 51, 51, 255, 255, 252, 252, 240, 240, 192, 192, 3, 3, 3, 3
580 DATA 3, 3, 3, 3, 48, 48, 48, 60, 60, 48, 48, 48, 0, 0, 0, 0, 15, 15, 15
590 DATA 15, 48, 48, 48, 60, 60, 0, 0, 0, 0, 0, 0, 252, 252, 12, 12, 12, 0, 0
600 DATA 0, 0, 0, 0, 255, 255, 0, 0, 0, 60, 60, 48, 48, 48, 48, 48, 48, 255
610 DATA 255, 0, 0, 0, 0, 0, 0, 255, 255, 48, 48, 48, 48, 48, 48, 240, 240, 48
620 DATA 48, 48, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
630 DATA 192, 192, 192, 192, 3, 3, 3, 3, 3, 3, 3, 3, 255, 255, 0, 0, 0, 0, 0
640 DATA 0, 255, 255, 255, 0, 0, 0, 0, 0, 0, 0, 0, 0, 255, 255, 255, 255, 3, 3
650 DATA 3, 3, 3, 3, 255, 255, 0, 0, 0, 0, 240, 240, 240, 240, 15, 15, 15, 15
660 DATA 0, 0, 0, 0, 48, 48, 48, 240, 240, 0, 0, 0, 240, 240, 240, 240, 0, 0
670 DATA 0, 0, 240, 240, 240, 240, 15, 15, 15, 15, 192, 192, 192, 192, 192
680 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
690 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
700 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
710 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
720 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
730 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
740 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
750 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
760 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
770 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
780 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
790 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
800 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
810 DATA 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192, 192
```

COMMODORE 64 PROGRAM

```
820 DATA 96  69  69  69, 101, 106,  85, 165, 101, 101, 101, 101, 101, 165,  85
830 DATA 69  102  ,01,  165, 101, 102, 106,  85, 165, 69,  69,  69,  69,  165
840 DATA 85  85  69  106  ,06,  69  69  69  69  85, 69  101  170  170  ,01  69
850 DATA 85,  85  85,  85  85,  85  85  85,  85  85  69  69  69,  85  85  69  85
860 DATA 102  102,  ,02,  85,  85  85  85,  85  102  102,  170  102  170  102  102
870 DATA 85  85  106  149  165  86  169  89,  85,  102,  102  96  89  101  102
880 DATA ,02  85,  165  150,  ,05,  165  166  153,  102  85  96  89  101,  85  85
890 DATA 85  85,  85,  90,  165  101  101  101,  165,  90  85  165  90,  86,  86  86
900 DATA 90  ;05  85,  86  ,50  165,  170,  165,  150,  85  85,  85,  89  89  106
910 DATA ,06,  89  89  85,  85  85,  85,  85,  85,  89  89,  101,  85  85  85  106
    DATA 106  85  85  85,  85,  85,  85  85  85  89  89  85  85,  86  89  89,  101
    DATA 101,  149,  85  106,  106,  102  102  ,02,  106,  106,  85,  89,  165,  89,  89
    DATA 89,  89,  106,  85,  106,  102  86  89  101  102,  106,  85,  89,  102,  86,  89
    DATA 86,  102,  89,  85  86,  90,  102,  102  106,  86  86,  85  106,  101  165  86
    DATA 86,  102  85,  85,  90,  101,  101,  106,  102  102,  89,  89,  106,  86  86,  90
    DATA 89  89,  89  85,  106,  102,  102,  106,  102,  102,  106,  85,  106,  102  102
    DATA ,06,  86  102  106,  85,  85  85  85  89  85,  89,  85,  85,  85  89  89
    DATA 85,  89,  89,  101,  86,  89,  ,01  101,  ,01  89  86,  85  85  85  106,  106
1   DATA 85,  106,  106,  85,  101,  89  86,  86,  86  89  ,01  85  89  ,02  86,  89
1   DATA 89  85  89,  85  85  85,  85  170,  170  85,  85  85,  89,  89  106,  106
1820 DATA 106  89,  106,  85  89  89  89  89,  89  89  89,  89  89,  85  85  85  170
1830 DATA 170,  85,  85,  85,  85,  85,  ,70  170,  85  85,  85,  85  85,  170,  170,  85
1840 DATA 85,  85,  85,  85  85  85,  85  85  170,  170  85  85  101  101  101,  101
1850 DATA 101,  101,  101,  101,  89  89,  89  89  89,  89  89  89  89  85  85,  85  165
1860 DATA 165,  165  89  89  101,  101  105,  106  90  85  85,  85  89  89,  165
1870 DATA 165,  165  165  85  85  149  149,  149  149,  149  149  170,  170  149
1880 DATA 149  165,  101  ,05  89  90  86  86,  86  90  89,  165,  101  165,  149
1890 DATA 170  170,  ,49,  149  149  ,49  149  ,49  170,  170,  86,  86  86  86,  86
,100 DATA 86  85  165  170  ,70  170  ,70,  165  85  85  85  85  85  85  170
1110 DATA 170  85  ;02  106  106  106  106  89  89  85  101,  101  101  101
1120 DATA 101  10,  ,01  ,01  85  85  85  90  106  165  10,  ,01  150  ,50
1130 DATA 170,  165,  165  170  ,50,  ,50  85  ,05  170  150  150,  170,  165  85
1140 DATA 89  89  ,02  10,  89  89  ,06  85  69  89  89  89,  89  89  89  89
1150 DATA 89  89  ,06  106  ,06  89  89  85  101  101  101  170  170,  10,  101
1160 DATA 101  149  149  101  ,01  149  149  101  101  101  101  101  101,  101
1.70 ▒▒▒▒ 101  101  ,0,  85  85  106  106  ,0,  ,02  ,02  85  170  170  ,06
1.80 ▒▒▒▒ ;06  90  90  86  86  85  85  85  85  85  85  85  85  ,65  ,65  ,65
1190 DATA 165  165,  ,65  165  ,65  85  85  85  85  170  ,70  ,70  170  170  85
1200 DATA 85,  85  85  85  85  85  85  85  85  85  85  85  85  ,70  ,49  ,49
1210 DATA 149  149  ,49  149  149  ,49  153,  ,53  102  ,02  153  153  102  102
,220 DATA 86  86  86,  86  86  86,  86  85  85  85  85  153  153  102  102
,230 DATA 170,  170,  169,  169  165  165  149  ,49  86  86  86  86  86  86,  86
1240 DATA 86,  101,  101,  101  106  106  ,01  10,  ,01  85  85  85  85  90  90
1250 DATA 90  90  101  ,01  10,  106  ,06  85  85  85  85  ,5  85  169  169
1260 DATA 89  89  89,  85  85  85  85  85  85  170  ,70  85  85  85  ,06  106
1270 ▒▒▒▒ 101  ,01  101  ,01  101  101  ,70  170  85  85  85  85  85  85  ,70
1280 ▒▒▒▒ 170,  101  ,01  101  10,  ,01  101  165  165,  10;  101  ,01  149  ,49
1,90 ▒▒▒▒ 149  149,  149  149  ,49  149  149  149  ,49,  ,49  149  ,49  149  ,49
1300 DATA 86  86  86,  86  86  86  86  86  170  170  85  85  85  85  85  85
,3 0 DATA ,70  170,  170  85  85  85  85  85  85  85  85  85  85  170  ,70,  ,70
1320 DATA 86  86  86,  86  86  86  170  ,70  85  85  85  165  165  165  ,65
,330 DATA 90  90  90  90  85  85  85  101  ,01  10,  165  165  85  85  85
,340 DATA 165,  165,  165,  165  85  85  85  85  ,65  165  165  165  90  90  90
1350 DATA 90 -999
1360 DATA ,20,  162  25,  142  20  3  162  192  142  21  3,  88  96  162  49  142
1370 DATA 20  3  162  234  142  21  3  88  96  206  56  3  240  3  76  49,  234
1380 DATA 174  55,  3,  ,42  56  3  173,  54  3  06  144  ,2  174  52  3  172
,390 DATA 54  208  142  54  208  140  52  3  106  144  12  172  53  3  174  38
1400 DATA 208,  140,  35  208  142  53  3  76  49  234  255 999
1405 READA X=X+A IFA=999THEN1420
```

```
1410 OOTO1400
1420 RESTORE L=2048 IFX<>17463STHENPRINT"ERROR IN DATA" STOP
     ▒▒▒▒▒▒▒▒IFA=-999THEN1450
1440 POKEL A ,=L+1 OOTO1430
1450 POKE56333 127 POKE, 51 FOR1=0TO2047 POKE4096+I PEEK(53248+I)
1460 POKE1 55 POKE56333 129
1470 ,=49152
1480 READA IFA=999THEN1500
1490 POKEL A ,=L+1 OOTO,480
1500 POKE53272 19 POKE53270 216
4000 FOR1=0TO2048 READA IFPEEK(,2048+1)<>ATHENPRINTI STOP
40.0 NEXT
READY.
```

Listing 1 — the machine-code program

```
5000 IROVEC = $0314
5010 IRQ = $EA31
5020 BAKCOL = $D334
5025 MULCOL1 = $D022
5027 MULCOL2 = $D023
5040 FORCOL = BAKCOL+1
5060 FLASHCTL = FORCOL+1
5070 FLASHTIM = FLASHCTL+1
5075 FLCOUNT = FLASHTIM+1
5080 * = $C000
5090 SEI
5100 LDX #<FLIRQ
5110 STX IROVEC
5120 LDX #>FLIRQ
5130 STX IROVEC+1
5140 CLI
5150 RTS
5160 LDX #<IRQ
5170 STX IROVEC
5 80 LDX #>IRQ
5190 STX IROVEC+1
5200 CLI
```

```
5210 RTS
5220 FLIRQ DEC FLCOUNT
5230 BED DOIT
5240 JMP IRQ
5250 DOIT LDX FLASHTIM
5260 STX FLCOUNT
5270 LDA FLASHCTL
5280 ROR A
5290 BCC FLASHFOR
5300 LDX BAKCOL
5.0 LDY MULCOL1
5320 STX MULCOL1
5330 STY BAKCOL
5340 FLASHFOR ROR A
5350 BCC EXOIT
5360 LDY FORCOL
5370 LDX MULCOL2
5380 STY MULCOL2
5390 STX FORCOL
5400 EXOIT JMP IRQ
READY.
```

Listing 2 — assembler listing showing how the machine code works. Do not type in

AGF

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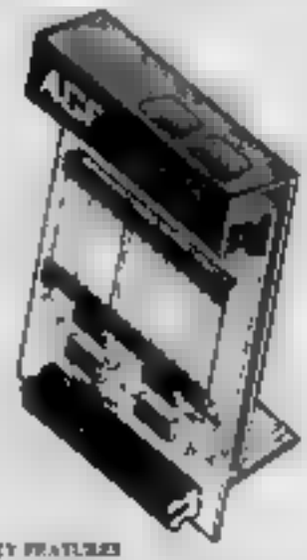

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- Easy extension connector for all other add-ons
- Two demo programs and instructions

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with manual, programs, demo tape
- Self adhesive programming chart detailing how to define which key is associated to L.E. DOWN, L.E. RIGHT and I.N.F. This can be fixed on to the side of your computer or peripheral for convenience when using software not by AGF. This chart is made of a very durable weather proofed plastic and is particularly easy to read.
- One pack of the Quick Reference Programming cards for programming games in your games requirements. The card allows you to easily see the configuration of an easy to read format with space to record the software name and computer types.
- Video Graffiti demonstration program which is written usually in BASIC to illustrate how all eight directions and fire can be read. This is also a useful high resolution drawing program.
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The Interface Module II resides in the total memory space of the keyboard which remains fully functional at all times. Therefore it will not interfere with anything else connected.

When a suitable joystick is plugged into Player 1 socket all actions will mimic pressing the cursor keys, up ... left, right and fire. The Player 2 socket will operate keys 6, 7, 8, 9 and 0. This means games can be used with both joysticks.

Take a look at the selection of compatible games we have listed. There are many added all the time as a result of our contact with the various software companies.

A second joystick may be connected to the 'Player 2' position which emulates as a pair of 'cursor keys' left, right, down, up, fire. This will allow you to play a whole new generation of two player games.

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3D MONTY MORAGE
MORAGE GOES SKIING
SP1 ... R13
PENETRATOR

Cassette Two contains:
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	SOFTWARE		
		FINAL TOTAL	

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For instance, if you're looking for the best way to begin computing, turn to our back page. You'll see that leading Sinclair retailers are now offering the popu ar ZX81, complete with a 16K RAM Pack *and* a free software cassette, all for £45 That means savings of at least £29 on one of the world's all-time best-selling computers.

Those same retailers are also offering the ZX Printer at its regu.ar price of £39.95, but accompanied by a *free* 5-roll Paper Pack, worth £11.95.

If you want to add even more speed and versatility to your ZX Spectrum system, you'll be pleased to hear that the new ZX Microdrive has now been officia.ly announced.

Microdrives are being released on an order of priority basis. Spectrum owners who purchased direct from us will be sent order forms, in a series of mailings that begin with the earliest names on our list of Spectrum owners. If you didn't buy direct from us by mail order, send us your name and address (use the coupon in this Sinclair Special). We ll add your name to the list, and send you a colour brochure and details on how to order.

Finally, if you're looking for more ways to use your ZX system, take a look at the software opposite There are programs for programmers, a space-chase and car race for arcade-game players, a brand new logic game for those who ve exhausted 'the cube'

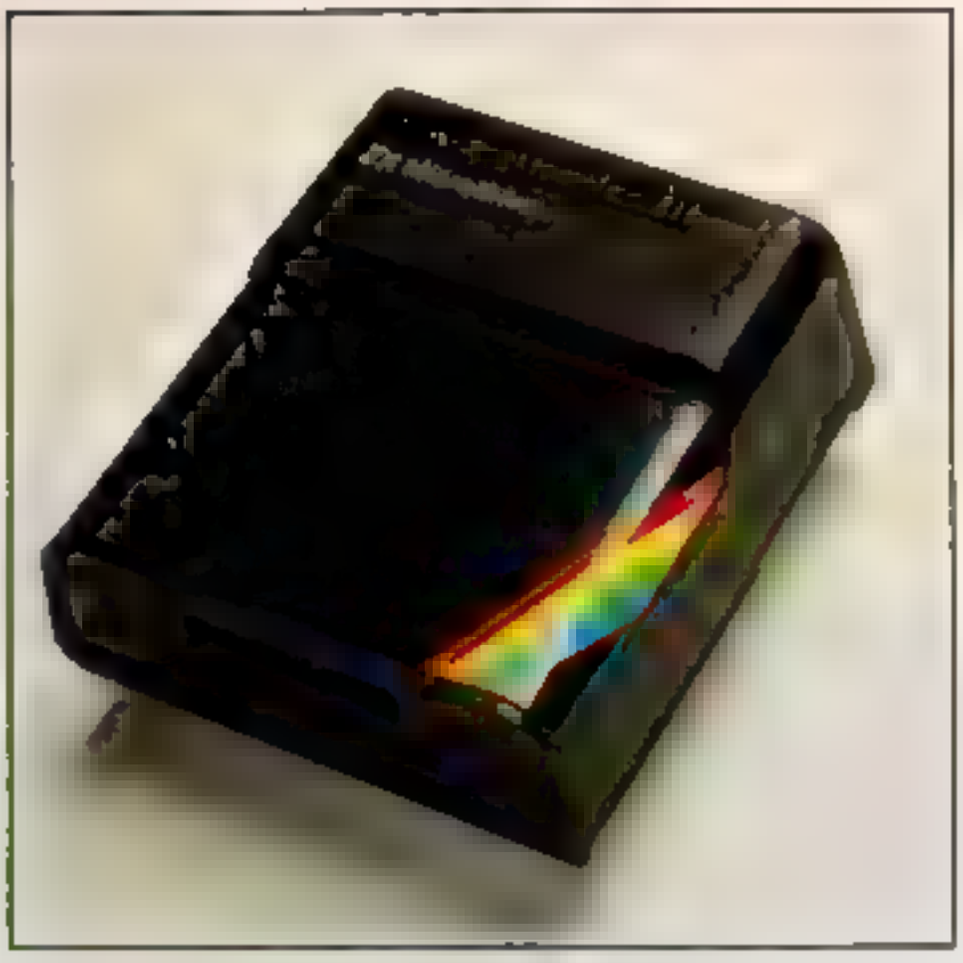
The Cattell IQ test is based on the definitive professional psychol-ogists' test – and forms an accurate but easy way of measuring your own IQ. All the new programs are available direct from us, through the order form in this issue.

You'll see what I mean about Sinclair having something for everyone And we ll have even more to show you at two forthcoming exhibitions the PCW Show at the Barbican Centre, from September 28th to October 2nd, and the Great Home Entertainment Spectacular at Olympia, from September 17th to 25th.

Nigel Searle

Nigel Searle, Managing Director
Sinclair Research Ltd.

ZX Microdrive System preview!



ZX MICRODRIVE

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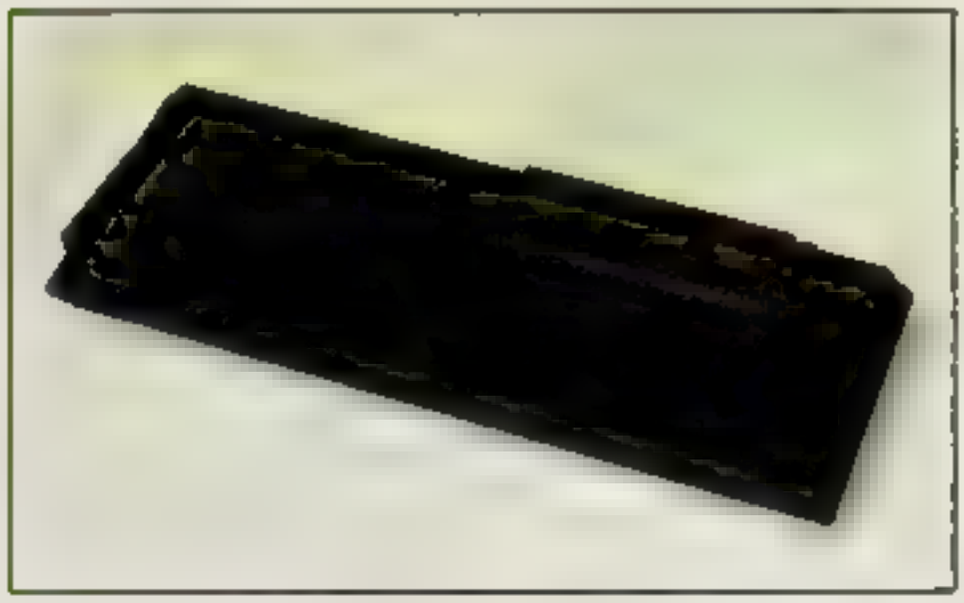

ZX INTERFACE 1

Necessary for sending and receiving information from ZX Microdrive Includes RS232 interface and local area network facility for 2 to 64 Spectrums. Attaches to the underside of your Spectrum. Purchased with ZX Microdrive, just £29.95. As separate item, £49.95.

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Sinclair have it all taped with six brand-new programs for ZX Computers!

Chequered Flag
For 48K RAM Spectrum. **£6.95**

Have you ever wanted to drive a Formula One car flat-out round a Grand Prix circuit? With Chequered Flag you'll need one eye on the road and one eye on the instruments, as you steer and brake to avoid hazards, and work through the gears in search of the lap or race record. This outstanding new program puts you in the driver's seat with stunning realism, and gives you a choice of three cars and ten different circuits. Don't crash!

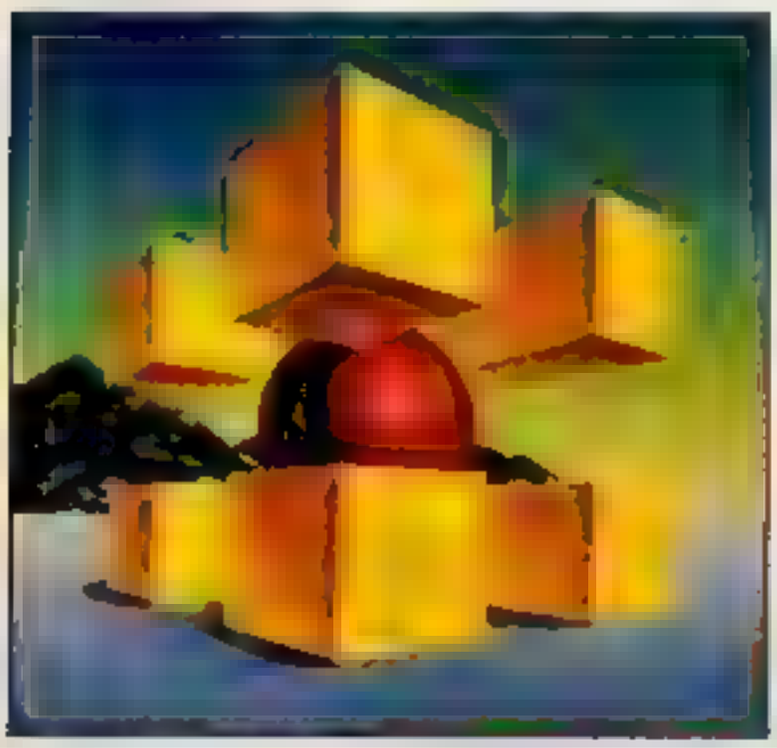
Mothership
For ZX81 with 16K RAM **£4.95**

Scream down the claustrophobic confines of the Zarway. Engage suicidal drone fighters in deadly laser combat. Dodge, duck and dive in a high-speed 3-D race to attack the evil Mothership before she claims your home planet. Mothership is a truly tough challenge, and fast, furious fun!

Cattell IQ Test
For 48K RAM Spectrum. **£12.95**

Although there are a number of so-called self-administered IQ tests on the market, the only reliable way of finding your IQ has – until now – been to visit a qualified psychologist and take a battery of tests – for a fee. Now Victor Serebriakoff, International President of Mensa, has produced Professor Cattell's test in a form which enables you to use your ZX Spectrum to test your IQ.

The Cattell Scale IIIA test is timed by the computer, marked immediately, and the marks standardised against your age. This is the first time that an accredited, standardised test has been available to the general public.



Zeus Assembler
For 48K RAM Spectrum. **£12.95**

A powerful and easy-to-use programming aid, designed to simplify the entire process of producing machine code programs, enabling you to write in assembly language instructions. Comes complete with comprehensive range of support facilities.

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With the highly versatile Monitor, you get an extensive set of facilities to aid the entry, inspection, modification and debugging of your own machine code programs.

Flippit
For 16K or 48K RAM Spectrums. **£9.95**

Like those cube games, Flippit looks simple. But its fiendish ingenuity results in the ultimate game of logic and patience. Twist, turn and swap the nine Flippit pieces in search of the elusive magic square. But be warned, those pieces can be arranged in *millions* of combinations.

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	ZX Spectrum 16K	3002	99.95	
	Postage and packing	0029	4.95	
			TOTAL £	

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	FOR SPECTRUM			
	L4/S Monitor & Disassembler	4403	12.95	
	L3/S Zeus Assembler	4402	12.95	
	G26/S Flippit	4025	9.95	
	P1/S Cattell IQ Test	4500	12.95	
	G31/S Chequered Flag	4030	6.95	
	FOR ZX81			
	G26 Mothership	2125	4.95	
			TOTAL £	

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Get your micro working

Though it won't actually [illegible] the tea, there are lots [illegible] useful jobs your computer can do for you — with the right software

SYSTEM — 4A
TI 99/4A (Extended BASIC, disk controller, disk drive) £30

Priory Computing, 14 Bridgewood, Brookside, Telford, Shrops

This suite of three spreadsheet-type programs could be a useful alternative to the PRK module for rich Texas owners.

It lets you create a form, called a 'screen', with full control of layout — and without some of the daft restrictions of the PRK. You must design everything on paper first, though

More than one field per screen line can be specified, and up to 20 fields over 23 screen lines are permitted, up to a total character count for the field contents of [illegible].

There are a number of useful screen-editing facilities, and on the whole I found the creation program easy to use.

As with the PRK, you can specify the type of data acceptable for each field, but I found one fault: the first field is used as the form number and must have a particular data type and a minimum number of characters

It is easy to overlook this, and it can cause problems later. You can come unstuck over character counts in a similar way

The documentation is very good. I could fault it in only one respect: not once does it tell you that you need Extended BASIC

instructions	[illegible]
ease of use	90%
display	[illegible]%
value for money	75%

★ ★ ★ ★

Statistics
[illegible] £6

Rainbow Research, 288 High Street, Enfield EN3 4HF

The statistics program package from Rainbow offers five procedures with up to 100 values in each. The procedures available are mean and standard deviations; T-tests; chi-square tests, contingency tables; and regression and least square fit.

The program is menu-driven On choosing your option, you input the data as prompted and after the last value the S key terminates the data input stage and any further mathematic work is computed and displayed

At this point the program drops out and to run any other option you have to type in RUN Surely it wouldn't take too much programming effort to return to the menu?

The instructions supplied are adequate if you understand statistics, but the less bright among us, like me, will find them difficult to follow

The program uses no graphics at all and would appear to turn the powerful BBC B into a calculator. Graphics could be a useful addition to anyone writing such a package.

J.H.

instructions	45%
ease of use	80%
display	0%
value for money	15%

★

[illegible]
Sharp MZ-80K [illegible]

Epsom, 25 Chartwell Place, off Downs Road, Epsom, Surrey

OK, so what will it do? Well, as well as allowing you to prepare and enter the text of your letters, you can send the whole thing to your printer for any number of copies to be printed

You can delete, add or amend any or all of the lines of text, as required, before sending to the printer. Your letter may be saved on cassette for later recall

You can also save a mailing list on cassette so that individually addressed copies of the same letter can be printed

Finally, up to five standard paragraphs can be set up, stored in memory and called upon at any time for adding to the main body of text as necessary

All of this is achieved via an eight option menu and three graphics pad keys.

A true word processor package will cost hundreds of pounds, so for £8 you can expect some limitations. Some of these are no more than 200 lines, each of 40 characters, is allowed; there is no count or indication of line length; and standard paragraphs cannot be SAVEd for future use

I had a few problems due to my non-standard Centronics printer/interface but a small amount of patching soon remedied the situation

More worrying was the syntax error reported on line 4360. The program stopped on every run until 4360 was deleted.

I.H.

instructions	80%
ease of use	[illegible]
display	70%
value for money	[illegible]

★ ★ ★ ★

Easyplot
BBC B £15.95

Synergy Software, Dept 1, 7 St Andrews Close, Slipend, Luton

This package is three separate menu driven programs, one for drawing line graphs, one for bar charts and one for pie diagrams.

Up to three line or bar charts, or four pie diagrams may [illegible] stored within each program and line or bar charts may be merged All diagrams can be saved on tape/disc or printed.

It is a sophisticated package which includes an excellent automatic scaling, sorting and labelling facility which removes most of the difficult work in graph design Users can opt for manual design but I found the automatic option more than adequate for most purposes

A powerful overwrite facility enables the user to print text anywhere on the screen and there is a wide choice of plot shapes and bar shading options available.

I found it extremely easy to set up well designed diagrams and the quality of the programming and prompts were such that the manual was almost superfluous.

The only real fault I could find was that printed symbols on pie diagrams were not always accurately positioned. Screen displays for the line and bar charts are black and white, which could be a drawback when coloured printers become widely used.

Easyplot's main use will be as a business utility

J.D.

	70%
instructions	95%
ease of use	75%
display	75%
value for money	

★ ★ ★ ★

[illegible]
48K Oric-1 £4.95

Database Systems, 82 Towers Rd, Poynton, Cheshire

A utility filing program for the Oric 1 costing less than £5? Can it be true? So it was with some enthusiasm I tried to load the program into my Oric.

Half an hour later I was still trying, and my enthusiasm was much diminished. A further 15 minutes went by before my Oric received an error free program

No instructions were provided with the program, so, if the word 'field' means little more to you than acres of grass, you may have problems.

However, once in use, the program proved to be a quite powerful computer filing system. All the usual features are there; enter, delete, sort, list, search, save file, and load file. The sort option operates on any field, and is very fast

The program is 'menu-driven', and the on-screen instructions make it easy to use. You can select the number and names of fields your require

The screen layout is unimaginative, and I thought the use of sound (e.g. SHOOT and EXPLODE) was misplaced in a 'serious' application program

However, if you have the patience to load the program, you could make a back-up copy, and have a simple, but effective and flexible database system for your Oric

D.N.

instructions	60%
ease of use	70%
display	40%
value for money	70%

★ ★ ★ ★

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BOOKS

In Issue 28 (13.9.83) Rosetta software appeared under books. Please see this week's software games section which is more applicable.

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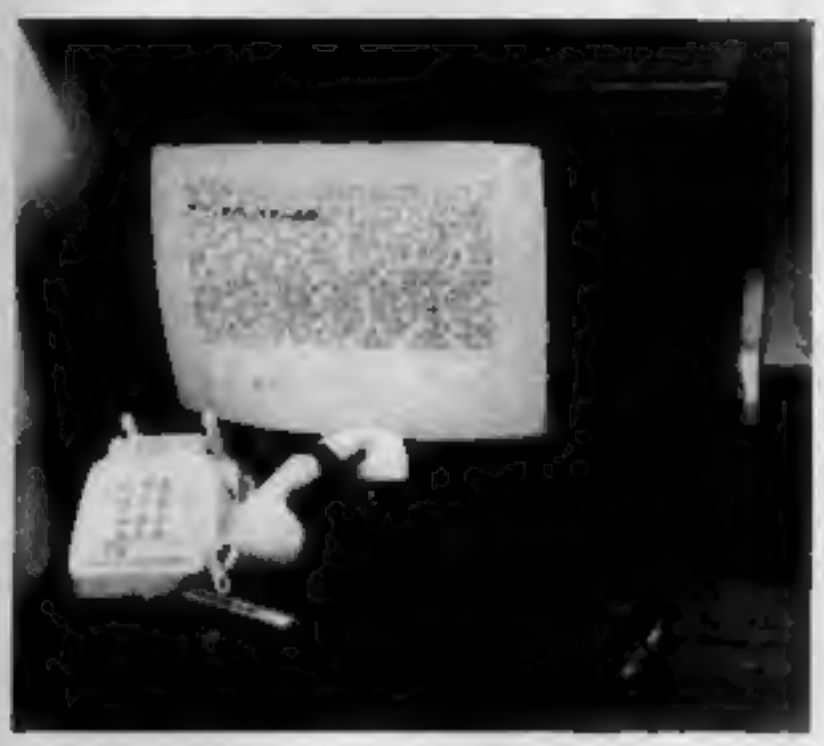

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